

**Bureau  
of  
Materials and Physical  
Research**

**Quarterly  
Management Report  
on  
Research Progress**

**Quarter Ending June 30, 2006**

## INDEX

### SPECIAL STUDIES

<u>STUDY NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
R06	Superpave Bituminous Mixture IL – 4.75.....	2
R06	TE-30 High Performance Rigid Pavements – Alternative Dowel Bar Materials.....	4
R06	Resin Modified Pavement.....	6
R07	Lighting, Sign, and Signal Structure Problems.....	8
	Evaluation of a Fiber Reinforced Polymer (FRP) Composite Bridge Deck Material (IBRC Program)....	10
	Hot Mix Asphalt Longitudinal Joint Sealants.....	12
	Hot Mix Open-Graded Resurfacing Layer (IL98-02)	14
R09	Welded Notch Toughness Test.....	16
R16	Development of a Tough Alloy Structural Steel.....	18
R19	SHRP Products Evaluation and LTPP Support.....	20
R20	Instrumentation Monitoring of Integral Abutments.....	22

# ILLINOIS CENTER FOR TRANSPORTATION

<u>STUDY NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
R27-1	Characterization of Illinois Aggregates for Subgrade Replacement and Subbase	25
R27-2	Nighttime Construction: Evaluation of Lighting Glare for Highway Construction in Illinois	27
R27-3	Design and Concrete Material Requirements for Ultra-thin Whitetopping Procedures	29
R27-4	Radiation Detection Pilot Program	33
R25-5	Bus-Only Shoulder Rider	35
R25-6	Illinois StreamStats	37
R27-8	Hot Mix Asphalt (HMA) Sampling	39
R27-19	Pier Scour Prediction in Cohesive Soils: Use of EFA-SRICOS	41
R28	Mechanistic Design Implementation and Monitoring.....	43
R39	Validation of Extended Life HMA Design Concepts.....	45
R43	Traffic Operations Laboratory.....	47
R44	Performance and Acceptance of Self-Consolidating Concrete.....	49
R53	Concrete Distress Identification.....	51
R54	Deck Beam Lifting Loops.....	53
R55	Tack Coat Optimization for Overlays.....	55
R56	Speed Photo Enforcement.....	57
R57	Evaluation and Implementation of Improved CRCP and JPCP Design Methods for Illinois.....	59
R58	Cost Effectiveness and Performance of Overlay Systems in Illinois.....	61
R59	Evaluation of Pavement Damage Due to New Tires.....	63

# HIGHWAY RESEARCH COUNCIL

<u>STUDY NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
HRC-4, R-07	Effectiveness of Sealers and Laminates for Concrete Bridge Decks.....	66
HRC-7, R-38	Investigation of LRFD Load Factors through Instrumentation of Bridge Bearings.....	68

# **SPECIAL STUDIES**

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Superpave Bituminous Mixture II - 4.75		Today's Date: 07/14/2006			
		Function Code: IHR-R06			
		Project Number:			
QPR Author Name: Aaron Toliver		Estimated Dates		Fiscal Year: 2006	
Telephone: (217) 782 - 0564	% Project Completed: 35%			JUL	OCT
Task Title		Start	Complete	SEP	DEC
Task 1: Preliminary Distress Surveys at Project Locations		5/2003	8/2003		C
Task 2: Field Testing and Construction Observation		8/2003	10/2000		C
Task 3: Construction Data Compilation		10/2003	6/2004		C
Task 4: Yearly Distress Surveys at Project Locations - 5 Yr.		5/2004	9/2008		I
Task 5: Long Term Performance Data Analysis		9/2004	12/2008		I
Task 6: Final Report and Recommendations		1/2009	4/2009		I
Task 7:		/	/		
Task 8:		/	/		
Task 9:		/	/		
Task 10:		/	/		
<b>Principal Investigator Name/Contact:</b> Aaron Toliver telephone: (217) 782 - 0564 e-mail: Aaron.T.Toliver@illinois.gov		P. I. Organization Name/Address: IDOT - BMPR 126 E. Ash Street Springfield, IL 62704		<b>Co-Investigator Name/Contact:</b> Laura Shanley telephone: (217) 524 - 7269 e-mail: Laura.Shanley@illinois.gov	
Description of Research: Evaluate the costs, constructability and performance of SUPERPAVE Bituminous Concrete Mixture IL - 4.75 (IL - 4.75). The results of this evaluation will be used to determine if IL - 4.75 is suitable for widespread application as a level binder on non-interstate highways. The findings may be used to suggest revisions to the IL - 4.75 contract special provision, or to suggest further research, if needed.				Keywords: SUPERPAVE, Sand Mix, IL-4.75, 4.75 mm NMAS, permeability, compaction, reflective cracking, overlay, blisters	
Technical Review Panel Names:		<b>TRP Telephone:</b> (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -	<b>TRP Email:</b>	Meeting Dates: / / / / / / / / / / / / / / / /	Minutes Available?
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected:		

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

<b>Project Title:</b> Superpave Bituminous Mixture II - 4.75	<b>Today's Date:</b> 07/14/2006
	<b>Function Code:</b> IHR-R06

Progress to Date (Limit narrative to what fits on this page):

Detailed preliminary surveys of existing pavement distresses at the four (4) test locations were conducted to determine the location, severity and probable causes of existing pavement distresses prior to overlay.

Data Collection Vehicles (DCVs) were dispatched to the test locations prior to construction for further assessment of preliminary pavement condition, including rutting and pavement smoothness. Follow-up surveys by the DCVs are to occur every year of the five (5) year study period, if funding permits; otherwise, DCV data collected every two (2) years for Condition Rating Surveys will be utilized.

Bid Tabulations were compiled for calculation of the initial construction costs.

Construction observation and field testing were completed at the test locations, with data collected regarding in-situ density and permeability, laboratory density, bituminous mix design, and aggregate gradation of the experimental and control level binders.

Frictional properties of the IL - 4.75 level binder were gathered at two (2) of the test locations for consideration of IL - 4.75 as a surface mix at a future date.

The process of compiling the pre-construction and construction field test data is complete.

The third of (5) five annual distress surveys at each location will be completed in Summer/Fall 2006.

The third of (5) five annual DCV "follow-up" surveys at each location will be completed in Summer/Fall 2006.

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Te-30 High Performance Rigid Pavements - Alternative Dowel Bar Materials (IL04-02)			Today's Date: 06/28/2006					
			Function Code: IHR-R06					
			Project Number:					
QPR Author Name: Mark Gawedzinski, P.E.			Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2799    % Project Completed: 80%					JUL	OCT	JAN	APR
Task Title			Start	Complete	SEP	DEC	MAR	JUN
Task 1: Monitor traffic and FWD data from five test sites			07/1996	/	I	I	I	I
Task 2: Perform initial FWD testing on fifth test site.			04/2005	10/2005	I	I	C	C
Task 3: Install round FRP dowel bars at fifth test site			08/2005	10/2005	I	I	C	C
Task 4: Install traffic classification system at fifth site.			10/2004	06/2006	I	I	I	C
Task 5:			/	/				
Task 6:			/	/				
Task 7:			/	/				
Task 8:			/	/				
Task 9:			/	/				
Task 10:			/	/				
<b>Principal Investigator Name/Contact:</b> Mark Gawedzinski, P.E. telephone: (217) 782 - 2799 e-mail: gawedzinskij@dot.il.gov			P. I. Organization Name/Address: IDOT BMPR 126 E. Ash St. Springfield, IL 62704		<b>Co-Investigator Name/Contact:</b>  telephone: (    )    - e-mail:			
Description of Research: Continued monitoring of alternative dowel bar materials in accordance with FHWA TE-30 High Performance Rigid Pavement Program.					Keywords: concrete pavement, alternative dowel bar, FRP dowels, FRP tubes, Stainless steel dowels, stainless steel tubes			
Technical Review Panel Names:		TRP Telephone:	TRP Email:		Meeting Dates:		Minutes Available?	
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Short Title & Date of Reports Available:			End User(s) and Result(s) Expected:					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547



## QUARTERLY PROGRESS REPORT (CONTINUED)

<b>Project Title:</b> Evaluation Of Alternative Dowel Bar Materials (FHWA Te-30 Program)	<b>Today's Date:</b> /    / <b>Function Code:</b> IHR-R06
<p><b>Progress to Date (Limit narrative to what fits on this page):</b></p> <p>Monitoring traffic classification and FWD performance at four sites across Illinois. Installed elliptical steel dowel bars at a fifth site (10/2004) round FRP bars (9/2005). Completed installation of traffic classification system at fifth site 6/06. Continue to collect FWD and traffic data from all five sites.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Semi-Flexible (Resin Modified) Pavement		Today's Date: 06/28/2006					
		Function Code: IHR-R06					
		Project Number:					
QPR Author Name: Mark Gawedzinski, P.E.		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2799    % Project Completed: 85%				JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Develop and cast Open Graded Asphalt Bricks		06/2004	09/2005	C			
Task 2: Develop cement grout		02/2005	09/2005	C			
Task 3: Test RMP samples		04/2005	12/2005	I	C		
Task 4: Search for field trial.		09/2005	/		I	I	I
Task 5: Develop special provision/work with District to construct project.		04/2006	/				I
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Mark Gawedzinski, P.E. telephone: (217) 782 - 2799 e-mail: gawedzinskij@dot.il.us		P. I. Organization Name/Address: IDOT BMPR 126 E.		<b>Co-Investigator Name/Contact:</b>  telephone: (    )    - e-mail:			
Description of Research:				Keywords:			
Technical Review Panel Names:		<b>TRP Telephone:</b> (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    -	<b>TRP Email:</b>	<b>Meeting Dates:</b> /    / /    / /    / /    / /    / /    / /    /	<b>Minutes Available?</b>		
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected: State DOT's, local agencies for asphalt areas prone to asphalt shoving.				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Semi-Flexible (Resin Modified) Pavement	Today's Date: 04/21/2006
	Function Code: IHR-R06
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Researched cement grout using polycarboxilite super-plasticizers to achieve the same flow cone time as the two commercially available grout systems. Obtained samples of both commercially available systems (EucoDensit and PL-7 resin additive). Numerous sets of cement cubes have been cast to evaluate short term strength and freeze-thaw durability. Three sets of 2 - 6 inch diameter 3 inch high test samples have been tested in an Asphalt Pavement Analyzer (APA) @25,000 cycles @ 64 C dry, then 25,000 cycles @ 64 C submerged. The samples were tested using a 100 lb. wheel load with 100 psi. air pressure. None of the samples show any signs of degradation. One set was later subjected to steel wheel testing for 25,000 cycles @ 64 C, submerged. Four inch diameter cores and 2 inch cubes survived 300 F/T cycles. In the process of looking for field trials</p> <p>05/2006 Working with District 3 to develop a special Provision for a project east of Genoa, IL.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING: JUN 2006

Project Title: <b>Special Studies</b> <i>Lighting, Sign and Signal Structure Problems (R07-1)</i>			Today's Date: 7/14/06			
			Function Code: IHR-R07			
			Project Number:			
QPR Author Name: Christopher Hahin, PE			Estimated Dates		Calendar Year: 2006	
Telephone: (217) 782-0574		% Project Completed: 93%			JAN	APR
Task Title			Start	Complete	JUL	OCT
Task 1: Investigate Thin Wall Aluminum Pole Failures			3/02	12/03	MAR	JUN
Task 2: Breakaway Couplings & Cast Iron Bases			7/02	6/04	C	
Task 3: Investigate Luminaire & Pole Vibration			7/02	12/05	C	
Task 4: Prepare Interim Reports			5/02	6/04	C	
Task 5: Investigate Stress Concentrations in Handholes			1/04	12/05	C	
Task 6: Propose New Pole & Base Designs			6/04	6/05	I	I
Task 7: Recommend Changes to ILDOT Std Specs			6/04	12/05	C	
Task 8: Discuss new transformer base designs with TX DOT and FL DOT			10/04	9/05	I	I
Task 9: Discuss and test brass breakaway couplings With TTI and other states			12/04	6/06	I	I
Task 10:			/	/		
<b>Principal Investigator Name/Contact:</b> Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:		P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704		<b>Co-Investigator Name/Contact:</b> telephone: (   )   - e-mail:		
Description of Research: Determine the cause of cracking in various light poles, sign and signal structures by measuring residual and live load stresses originating from design, fabrication, welding and fit-up of telescoping, flange and other joints; investigate failures of aluminum, stainless, and steel light poles & luminaires, breakaway couplings, and the feasibility of fatigue-resistant cast iron pole bases with low impact toughness and electrical handholes.					Keywords: light poles; luminaires; fatigue; aluminum; cast iron; stainless steel; signals; sign structures	
<b>Technical Review Panel Names:</b> Mark Seppelt Jim Sterr Mike Renner Jim Schoenherr		<b>TRP Telephone:</b> (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -		<b>TRP Email:</b>		<b>Meeting Dates:</b> / / / / / / / / / / / / / /
<b>Minutes Available?</b>		<b>Short Title &amp; Date of Reports Available:</b>				
<b>End User(s) and Result(s) Expected:</b> Bureau of Operations; Bureau of Design & Environment						

## QUARTERLY PROGRESS REPORT (CONTINUED)

<p>Project Title: <b>Special Studies</b>  <i>Lighting, Sign and Signal Structure Problems (R07-1)</i></p>	<p>Today's Date: 7/14/06  Function Code: IHR-R07-1</p>
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><i>Dec 2003:</i> A meeting was held with representatives of HAPCO, a leading manufacturer of aluminum light poles, and the Bureaus and Districts concerned with recent pole failures. HAPCO described the basis for the newest AASHTO specifications on pole design. Another meeting with the contractors, vendors and suppliers was conducted to resolve the need for immediate replacement of failed poles under warranty. Their final proposal for pole replacement is to be submitted in late Jan 04 for review by the Department.</p> <p><i>Mar 2004:</i> A theoretical analysis confirmed the field measurements of 4-5 g forces sustained by luminaires on the LeClaire Bridge. Trucks passing at 55 mph or more create a localized pulse of 8-10 ms duration, resulting in both deck and pole deflection. Using the approximation of deck and pole deflection angle through the rigid parapet, g-forces were correlated to be a direct function of truck weight, speed and luminaire height.</p> <p><i>Jun 2004:</i> A final draft report regarding the luminaire failures on the I-80 Le Claire Bridge was completed, and reviewed by various officials in the Bureaus of Materials &amp; Physical Research, Design &amp; Environment, and Bridges and Structures. The final report was revised, and included virtually all of the reviewer's comments. Final printed report scheduled for release to Districts 2 and 4 in August, 2004.</p> <p><i>Sep 2004:</i> Final report submitted to District 2 regarding the I-80 luminaire failures. Recommendations included: 5g fixture is a minimum; shorten poles to 27.5 ft high; use galvanized steel poles which have better damping capacity; consider use of shaded parapet lighting; coat the pavement decking with masonry coatings with higher reflectivity. Sources of high-g lighting were also explored. A pooled fund proposal was placed on the Internet to solicit assistance from other states with similar luminaire vibration problems.</p> <p><i>Dec 2004:</i> Reviewed proposal of manufacturer (sent from BDE) to changes of hand hole geometry, including: full penetration welds, thicker casting, and grinding of weld profile. Would slightly increase fatigue category, but high stress concentration at hole in pole would still be excessive at high wind speeds.</p> <p><i>Mar 2005:</i> Reviewed proposal of University of Illinois Dept of Civil Engineering regarding cyclic testing of aluminum, steel and fiber composite 40 ft light poles to determine amplitude, frequency and damping effects.</p> <p><i>June 2005:</i> Extensive changes to Article 1069 of Illinois Standard Specifications were submitted to the Bureau of Design regarding materials and light pole &amp; tower design. Deflection limits in high mast poles and hand hole stress concentrations were subject to in-depth analysis. Report of results expected in next quarter.</p> <p><i>Sep 2005:</i> Single piece lighting pole design, consisting of a telescoping cast base, with handhole, then welded to the tapered pole, was discussed with D&amp;E Electrical Unit. Design has fewer sites for fatigue or overload from high winds. I-80 luminaire vibration study published. Awaiting report of vibration studies of aluminum, steel and fiberglass poles from the University of Illinois.</p> <p><i>Dec 2005:</i> Final draft report received from the Univ of IL regarding pole vibration studies. Feedback received from pole manufacturers regarding proposed changes to IL Standard Specifications; extensive changes to be placed in Special Provision form.</p> <p><i>Mar 2006:</i> Draft report of Univ of IL was reviewed, and its deficiencies were provided to the Bureau of Design. Discussions of drop-weight impact testing of individual couplings were conducted with MPM Technologies regarding energy absorption of free-cutting brass breakaway couplings. Coupling design was completed and materials were received. A test of the Hapco vibration-resistant pole for the I-80 bridge at Le Claire was discussed with WJE, Inc., a testing firm from Oak Brook, IL. Test was scheduled for the 4<sup>th</sup> Quarter of FY 2006.</p> <p><i>Jun 2006:</i> WJE provided a quotation of \$22,000 to instrument and record g-forces on a HAPCO pole design which supposedly attenuates vibration for the I-80 Le Claire Bridge. The free-cutting brass hexagon breakaway coupling design was fabricated &amp; machined. Costs of drop-weight testing the couplings for impact energy absorption were solicited from MPM Technologies, Taylor Devices, and Staveley Services.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING JUNE 2006

Project Title: Evaluation Of A Fiber Reinforced Polymer (Frp) Composite Bridge Deck Material. Ibrc # II98-08		Today's Date: 7/13/2006					
		Function Code: IHR-R07					
		Project Number:					
QPR Author Name: Tom Winkelman		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2940	% Project Completed: 85%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Literature search for FRP composite materials		1/2000	12/2001	C	C	C	C
Task 2: Innovative feature workplan preparation		3/2000	10/2001	C	C	C	C
Task 3: Observe bridge deck construction		7/2001	12/2001	C	C	C	C
Task 4: FRP material testing		1/2002	12/2006	I	I	I	I
Task 5: Bridge deck instrumentation		3/2003	8/2003	C	C	C	C
Task 6: Construction report		4/2002	9/2002	C	C	C	C
Task 7: Performance evaluations		12/2001	12/2006	I	I	I	I
Task 8: Final report		10/2006	6/2007				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Tom Winkelman telephone: (217) 782 - 2940 e-mail: winkelmantj@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		<b>Co-Investigator Name/Contact:</b> telephone: (   )   - e-mail:			
Description of Research: This research will involve evaluating the construction and field performance of a fiber reinforced polymer (FRP) composite bridge deck material.  Literature searches on composite materials and their related material and physical properties. Observation of the construction process and field evaluation of the completed bridge deck. Laboratory testing of samples from the composite material. A construction report and final report will be written to document the performance of this experimental material.				Keywords: bridge deck, fiber reinforced polymer composite, "DURASPAN"			
Technical Review Panel Names:	TRP Telephone:	TRP Email:	Meeting Dates:	Minutes Available?			
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Short Title & Date of Reports Available:		End User(s) and Result(s) Expected:					
		IDOT - BBS, LR & S, Districts					
		New material for smaller bridges					
		New specifications					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of A Fiber Reinforced Polymer (Frp) Composite Bridge Deck	Today's Date: 7/13/2006
	Function Code: IHR-R07

Progress to Date (Limit narrative to what fits on this page):

2004 1<sup>st</sup> Quarter  
Color, gloss, and hardness tests were completed on the remaining material samples. Compression, tensile, and flexural strengths along with resin content and water absorption will be completed in the second quarter.

2004 2<sup>nd</sup> Quarter  
Resin content and water absorption tests were completed. Compression, tensile, and flexural strength tests were delayed due to scheduling and availability of the laboratories.

2004 3<sup>rd</sup> Quarter  
No activity.

2004 4<sup>th</sup> Quarter  
An annual performance survey was completed in December, and the annual reporting form was submitted to the FHWA. All material tests for this year were completed.

2005 1<sup>st</sup> Quarter  
Color, gloss, and hardness tests were completed on the remaining material samples. Compression, tensile, and flexural strengths along with resin content and water absorption will be completed in the second quarter.

2005 2<sup>nd</sup> Quarter  
Resin content and water absorption tests were completed during this quarter.

2005 3<sup>rd</sup> Quarter  
No activity.

2005 4<sup>th</sup> Quarter  
The annual performance distress survey was completed, and the necessary reporting forms completed. Areas of distress and split joints were found on the underside of the FRP bridge deck at some of the manufactured joints. The compression, flexural, and tension testing was completed as the test machines in the laboratories are operational again.

2006 1<sup>st</sup> Quarter  
No activity.

2006 2<sup>nd</sup> Quarter  
The color, gloss, hardness, resin content, and water absorption tests were completed on the last set of material samples. Samples were also prepared for the compression, tension, and flexural strength tests.

# PROGRESS REPORT FOR THE QUARTER ENDING JUNE 2006

Project Title: Hot Mix Asphalt Longitudinal Joint Sealants (IL03-04)		Today's Date: 7/13/2006					
		Function Code: IHR-R07					
		Project Number:					
QPR Author Name: Tom Winkelman		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2940	% Project Completed: 50%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Literature Search of Product Use and Experience		5/2003	6/2004	C	C	C	C
Task 2: Project Construction		8/2003	10/2003	C	C	C	C
Task 3: Construction Report		1/2004	6/2004	C	C	C	C
Task 4: Project Evaluations		10/2003	10/2008	I	I	I	I
Task 5: Interim Report		1/2007	6/2007				
Task 6: Final Report		10/2008	6/2009				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelmantj@dot.il.gov		P. I. Organization Name/Address: Illinois DOT Bureau of Materials and Research 126 E. Ash Springfield IL 62704		<b>Co-Investigator Name/Contact:</b> Laura Shanley telephone: (217) 524 - 7269 e-mail:shanleyll@dot.il.gov			
Description of Research: The goal of this research is to evaluate the performance of two longitudinal joint sealants for hot mix asphalt pavements. The two products under evaluation are "J-Band" from Heritage Research Group and "Quik-Seam" from Hendy Products, Inc... Documentation of the construction procedures and performance measures including density at the joint and permeability will be evaluated. Annual performance checks will be used to monitor the performance of the two materials.				Keywords: Hot Mix Asphalt, Longitudinal Joints, Sealants, J-Band, Quik-Seam, Density, Permeability			
<b>Technical Review Panel Names:</b> David Lippert Jim Trepanier Laura Shanley Tom Winkelman		<b>TRP Telephone:</b> (217) 782 - 2631 (217) 782 - 9607 (217) 524 - 7269 (217) 782 - 2940 ( ) - ( ) - ( ) -		<b>TRP Email:</b>		<b>Meeting Dates:</b> / / / / / / / / / / / / / /	
<b>Minutes Available?</b>							
Short Title & Date of Reports Available:				End User(s) and Result(s) Expected:			

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.



## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Hot Mix Asphalt Longitudinal Joint Sealants	Today's Date: 7/13/2006
	Function Code: IHR-R07
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>2003 2nd Quarter Research has just been initiated. Project has been selected on IL Rt. 26 in Stephenson County.</p> <p>2003 3rd Quarter Three official projects have been selected and constructed as part of the research. The first project is located on Illinois Route 50 (Cicero Avenue) in District 1. The second project is located on Illinois Route 26 in District 2, and the third is located on Interstate 57 in District 1. All three projects were constructed during the third quarter. The first two projects incorporated both types of joint sealant, while the third project only used the J-Band material. All three projects were tested for field permeability at the joint, and were cored for laboratory testing.</p> <p>2003 4<sup>th</sup> Quarter A fourth project was constructed on Interstate 70 during the third quarter and added to the research. This project used only the J-Band material. Laboratory testing and some initial work on the construction report were also completed during this quarter.</p> <p>2004 1<sup>st</sup> Quarter Work on the construction report has continued. Field evaluations of the projects will be conducted this summer.</p> <p>2004 2<sup>nd</sup> Quarter A field evaluation of the project on IL Rt. 26 north of Freeport was completed in May. No significant comparison results were found at this project.</p> <p>2004 3<sup>rd</sup> Quarter Field evaluations were completed for the experimental projects constructed on Interstate 70 near Martinsville, Interstate 57 near Peotone, and Illinois Route 50 near Matteson. No significant comparison results were found on any of the projects. A construction report documenting all four experimental projects was completed.</p> <p>2004 4<sup>th</sup> Quarter No activity to report.</p> <p>2005 1<sup>st</sup> Quarter No activity.</p> <p>2005 2<sup>nd</sup> Quarter Field evaluations were completed for the experimental projects constructed on Illinois Route 26, Illinois Route 50, and Interstate 57. Some parallel centerline cracking was noted in the J-Band section of Illinois Route 26. No significant comparison results were found on the remaining projects.</p> <p>2005 3<sup>rd</sup> Quarter No activity to report.</p> <p>2005 4<sup>th</sup> Quarter A field evaluation was completed for the experimental project on Interstate 70. No joint distress was found.</p> <p>2006 1<sup>st</sup> Quarter No activity to report.</p> <p>2006 2<sup>nd</sup> Quarter No activity to report. Field evaluations will be completed during the third quarter of calendar year 2006.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Hot Mix Asphalt Open Graded Resurfacing Layer (II98-02)			Today's Date: 7/13/2006						
			Function Code: IHR-R07						
			Project Number:						
QPR Author Name: Thomas Winkelman			Estimated Dates		Fiscal Year: 2006				
Telephone: (217) 782 - 2940		% Project Completed: 60%			JUL	OCT	JAN	APR	
Task Title			Start	Complete	SEP	DEC	MAR	JUN	
Task 1: Project Construction			/1998	/1998	C	C	C	C	
Task 2: Annual Inspections			7/1998	7/2010	I	I	I	I	
Task 3: Pavement Coring & Material Testing			7/2006	12/2006					
Task 4: Final Report			7/2010	12/2010					
Task 5:			/	/					
Task 6:			/	/					
Task 7:			/	/					
Task 8:			/	/					
Task 9:			/	/					
Task 10:			/	/					
<b>Principal Investigator Name/Contact:</b> Thomas Winkelman telephone: (217) 782 - 2940 e-mail: Thomas.Winkelman@illinois.gov			P. I. Organization Name/Address: Illinois DOT Bureau of Materials and Research 126 E. Ash St. Springfield IL 62704		<b>Co-Investigator Name/Contact:</b>  telephone: (   )   - e-mail:				
Description of Research: An asphalt crack relief layer or open graded resurfacing layer was used to mitigate reflective cracking from appearing on the surface of new overlays. This layer separates the existing deteriorated PCC pavement from the new overlay. The open graded nature of this layer will also be advantageous for draining excess water out of the pavement structure. Cores will be taken and material tests performed towards the end of the overlays life cycle to determine the effectiveness of the open graded layer.					Keywords: open graded drainage layer, HMA overlays, stripping				
Technical Review Panel Names:		TRP Telephone: (   )   - (   )   - (   )   - (   )   - (   )   - (   )   - (   )   - (   )   -		TRP Email:		Meeting Dates: /   / /   / /   / /   / /   / /   / /   /		Minutes Available?        	
Short Title & Date of Reports Available:				End User(s) and Result(s) Expected:					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Hot Mix Asphalt Open Graded Resurfacing Layer	Today's Date: 7/13/2006
	Function Code: IHR-R07
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>2006 2<sup>nd</sup> Quarter No activity to report.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING: JUN 2006

Project Title: <b>Engineering and Technical Investigations</b> <i>Welded Notch Toughness Test (R09-1)</i>		Today's Date: 7/14/06	
		Function Code: IHR-R09	
		Project Number: ITRC      FY 2006	
QPR Author Name: Christopher Hahin, PE		Estimated Dates	
Telephone: (217) 782- 0574	% Project Completed: 90%	Calendar Year: 2006	
		JAN	APR
		JUL	OCT
Task Title	Start	Complete	
Task 1: Apply welded notch test to high performance steels	1/01	6/02	C
Task 2: Apply welded notch test to other steels and non-ferrous metals	6/02	9/06	I   I
Task 3: Write technical manual for fabricators & researchers for use of test	1/02	12/06	I   I
Task 4: Publish findings in ASM, AWS and other technical journals	2/03	3/06	C
Task 5: Propose test for inclusion into ILDOT specs and AWS code	7/03	6/07	I   I
Task 6:	/	/	
Task 7:	/	/	
Task 8:	/	/	
Task 9:	/	/	
Task 10:	/	/	
<b>Principal Investigator Name/Contact:</b> Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:		P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704  <b>Co-Investigator Name/Contact:</b> telephone: (   )   - e-mail:	
Description of Research: The welded notch toughness test determines the actual toughness of a welded joint by joining two beveled base plates with a small land area (4 mm typical) of similar or dissimilar metals. When welded together in a rigid fixture, they form a natural, sharp notch. Welding conditions can be controlled to measure the effects of voltage, amperage, travel speed, electrodes, different welding processes or various combinations of base metals. Beveling 30 deg on each plate results in a 60° included angle, providing a CVN-style weld joint; or, if one plate has a 45° bevel and the other is square-cut, the toughness of the HAZ can be found. Test fixture is portable, and provides high shrinkage restraint for welded plates.		Keywords: welded notch test; toughness; weld joints; weldments; steel; Charpy V-notch; heat-affected zone; HAZ	
Technical Review Panel Names:	TRP Telephone:	TRP Email:	Meeting Dates:
	(   ) -		/ /
	(   ) -		/ /
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Short Title & Date of Reports Available: "As-Welded Notch Toughness Test for Steel Weldments", <i>Welding Journal</i> , Vol 70, No 2, Feb 91, pp 47-54.; "Welded Notch Toughness Testing", <i>Advanced Materials &amp; Processes</i> , Feb 2005, pp 49-52.		End User(s) and Result(s) Expected: Bureaus of Bridges & Structures; AWS; ASTM; AASHTO	

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Engineering and Technical Investigations</b> <i>Welded Notch Toughness Test (R09-1)</i>	Today's Date: 7/14/06 Function Code: IHR-R11
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><i>Dec 2002:</i> Welded notch toughness testing of Duracorr (ASTM A1010 stainless steel) and ER309L weldments at 30 kJ/in heat input with 60° V-grooves and 4 mm land area notches show a uniform ASTM E23 Charpy style V-notch toughness of 60 ±3 ft-lbs in the temperature range of -10°F to +70°F. Weld metal impact was also 60 ft-lbs at 0°F, which is obtained by notching the machined, flat weld bead and impacting the natural notch side by the striker tup. This uniformity of CVN toughness at 60 ft-lbs in the range of -10°F to +70°F indicates that this weldment is still at the upper shelf of the sigmoidally-shaped energy absorption curve.</p> <p><i>Mar 2003:</i> The welded notch and HAZ notch toughness tests were included in Special Provisions specified for the IL83 &amp; US 45 Bridge over the Wisconsin Central RR to determine the effects of substituting materials, or changing certain essential variables, on the toughness of weldments of ASTM A710 Grade B high performance steel. Essential variables described in Section 5 of the AWS D1.5 Bridge Welding Code include: (a) changes in filler metals; (b) sizes of electrodes or their classification; (c) changes in polarity, heat input or gas shielding [e.g., change from CO<sub>2</sub> to argon-oxygen cover gases], and (d) preheat temperatures.</p> <p><i>June 2003:</i> Work on this project delayed due to higher priority efforts in D-1 and D-8.</p> <p><i>Sep 2003:</i> Work on this project delayed due to higher priority efforts in D-1, D-2, D-4 and D-8.</p> <p><i>Dec 2003:</i> Work on this project delayed due to higher priority efforts for D-1, D-2, D-4, D-8 and the Bureau of Design &amp; Environment.</p> <p><i>Mar 2004:</i> An abstract was forwarded to ASM International's Fabricated Structural Steel Symposium, to be presented in October 2004, outlining the use of the welded notch toughness in determining the toughness of weldments of A710 Grade B for use in general structural work.</p> <p><i>Jun 2004:</i> Abstract previously submitted was accepted by ASM International, and presentation of the topic was scheduled for delivery at the ASM International Materials Conference in Columbus, OH in October 2004. Work on an article regarding welding of ASTM A710 Grade B was started, intended for submission to the journal <i>Advanced Materials and Processes</i>.</p> <p><i>Sep 2004:</i> A technical paper was submitted and accepted for inclusion in the ASM International Conference on Fabricability of High Performance (HP) Steels in Columbus, OH, entitled "Welded Notch Toughness Testing of ASTM A710 Grade B HP Steel". The paper is scheduled to be published in the November issue of <i>Advanced Materials and Processes</i>.</p> <p><i>Dec 2004:</i> Publication delayed until Feb 2005 by ASM International. Sent graphic of cable-stay Mississippi Bridge in St. Louis to journal editor per her request; bridge to use HP steels.</p> <p><i>Mar 2005:</i> Article, "Welded-Notch Toughness Testing", authored by principal investigator, published in February, 2005 issue of <i>Advanced Materials &amp; Processes</i>, pp-49-52, in the "Tech Spotlight" section.</p> <p><i>June 2005:</i> An invited presentation was given at the Univ of Illinois Civil Engineering Seminar Series regarding the use of the welded notch toughness in qualifying weldments for ASTM A710 Grade B high performance steel.</p> <p><i>Sep 2005:</i> Discussed with Bureau of Bridges &amp; Structures inclusion of welded notch toughness test into Standard Specifications as a supplemental test to standard AWS tests.</p> <p><i>Dec 2005:</i> Work on this project delayed due to higher priority efforts in D-1.</p> <p><i>Mar 2006:</i> Work on this project delayed due to higher priority efforts in D-1, D-9, D-2 and D&amp;E.</p> <p><i>Jun 2006:</i> Work on this project delayed due to higher priority efforts in D-1, D-9, Operations and D&amp;E.</p>	

## PROGRESS REPORT FOR THE QUARTER ENDING: JUN 2006

Project Title: <b>Engineering and Technical Investigations</b> <i>Development of a Tough Alloy Structural Steel (R09-1)</i>			Today's Date: 7/14/06						
			Function Code: IHR-R16						
			Project Number:						
QPR Author Name: Christopher Hahin, PE			Estimated Dates		Calendar Year: 2006				
Telephone: (217) 782- 0574		% Project Completed: 93%			JAN	APR	JUL	OCT	
Task Title			Start	Complete	MAR	JUN	SEP	DEC	
Task 1: Perform weldability studies			7/00	6/02	C				
Task 2: Investigate use in bridges, sign & signal structures; rebars			10/01	6/03	C				
Task 3: Propose new ASTM or AASHTO specifications for use of alloy			1/02	9/04	C				
Task 4: Prepare tech data document for applicability of ASTM A710 Grade B			5/02	6/06	I	I			
Task 5: Machinability studies of high performance steels			9/03	12/05	I	I			
Task 6: Determine temperature range for heat straightening for A710 Grade B			4/05	4/06	C				
Task 7:			/	/					
Task 8:			/	/					
Task 9:			/	/					
Task 10:			/	/					
<b>Principal Investigator Name/Contact:</b> Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:			P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704		<b>Co-Investigator Name/Contact:</b>  telephone: (   )   - e-mail:				
Description of Research: Using an earlier high performance (HP) steel developed by Northwestern Univ. on behalf of FHWA and US Navy, its composition was modified by BMPR and ASTM Committee A01.02. This HP steel has 0.03-.09% C, with 1.3% Cu, 1.0% Ni, 0.7% Mn and 0.4% Si. Its toughness is typically 100 ft-lbs or more at sub-freezing temperatures. The alloy represents a major development in hot-rolled HP steels, not require quenching & tempering or other thermo-mechanical processing. Normalizing may be specified for very high toughness. The cost/ton is directly competitive with conventional weathering steel (ASTM A588). Application into various bridges and other structures requires further exploration.					Keywords: alloy steel; high performance; copper; nickel; low carbon; toughness; weathering steel; bridges; structures				
Technical Review Panel Names:		TRP Telephone: (   )   - (   )   - (   )   - (   )   - (   )   - (   )   - (   )   -		TRP Email:		Meeting Dates: /   / /   / /   / /   / /   / /   / /   /		Minutes Available?	
Short Title & Date of Reports Available: "High Performance Copper-Precipitation Hardened Steel", <i>Microalloyed Steels 2002, ASM Intl Materials Solutions Conference</i> , 7-9 Oct 02, Columbus, OH				End User(s) and Result(s) Expected: Bureaus of Bridges & Structures; ASTM; AASHTO					

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Development of a Tough Alloy Structural Steel</b>	Today's Date: 7/14/06
	Function Code: IHR-R16

Progress to Date (Limit narrative to what fits on this page):

*Mar 2004:* Face milling studies of A710 and A709 high performance steels indicate a surprisingly superior finish with high performance steels vs. A36 when using a fly-cutter with carbide insert. Surfaces are equivalent to ground finishes. Roughness on A36 was expected compared its free-machining counterpart SAE 12L14 due to its greater number of laminated particles of carbide and ferrite (pearlite). Since both A709 and A710 have substantially lower carbon (0.08-0.10%C), it is thought that their more uniformly harder matrix makes the milled surface much smoother. In these steels, the fly cutter does not abruptly run into hard pearlite clusters, and then a softer ferrite, as in A36. For carbon steels with 0.20-0.40 %C, this results in a peak-and-valley cut. Also, the ductility of the chip in A36 also does not lend itself to an even surface cut. The results for A710 and A709 indicate that fly-cut milling virtually eliminates the need for grinding in most structural work; resulting in a significant cost savings.

*Jun 2004:* Machining Research has completed all the work on end milling of HP steels, including A710 Grade B, using high speed steel bits. Progress on end milling using carbide bits is proceeding, and a report is to be made available on end milling in July, 2004. Various standard and special drills are being acquired to complete the last phase of the experimental portion of this project.

*Sep 2004:* Machining Research provided a comprehensive report on the milling phase of the high performance (HP) steel machinability study. Compared to A36, A710 HP and A709 HP steels had better milled surfaces, and cutting them resulted in less wear on end mills, improving their life and cutting time. These improvements are attributed to the limited amount of iron carbide and more uniform distribution of hardness compared to conventional A36 structural steel.

*Dec 2004:* Progress is continuing on comparative studies of drilling of HP steels, based on twist and core drill wear. Estimated completion, late March or early April 2005.

*Mar 2005:* Industrial Steel of Gary, IN, selected as the fabricator for the IL-83 bridge over the CNRR. Inquiry as to whether heat straightening could be used to increase camber. Since no data is available as to effects of precipitation-hardening of this alloy on toughness, 700F was recommended as highest permissible temperature. Study to determine temperature effects contemplated. Principal investigator from Machining Research reports severe illness; no progress on drilling to date.

*Jun 2005:* Machining Research has acquired hollow point Hougen drills for high performance steel drilling study; principal investigator reports partial recovery from illness. Toughness tests conducted by Northwestern Univ indicate that heat straightening of A710 Grade B up to 1200F did not affect notch toughness, but will increase yield & tensile strength, and a small decrease in ductility.

*Sep 2005:* Drilling tests still in progress at Machining Research. Toughness tests at 70F at BMPR of A710 Grade B subjected to 1 hr of exposure at 900F, 1000F, and 1050F showed only an 8% loss of the as-received average CVN toughness of 168 ft-lbs.

*Dec 2005:* No progress reported from Machining Research. Telephone and fax inquiries were sent on 1/17/06 to determine whether the principal investigator can perform work, or have one of his associates complete the remainder of the drilling studies. Offers to help in completing final report were also made.

*Mar 2006:* A joint technical article, authored by C. Hahin, PI of this work unit, S. Vaynman and M. Fine of Northwestern Univ, and C. Crosby of Industrial Steel Corp., was submitted to *Modern Steel Construction* regarding the use of A710 Grade B in the IL-83 Bridge over the CNRR, and was accepted for publication. Editor has requested more photographs for the article.

*Jun 2006:* Machining Research reports that cutting wear on hollow HSS core drills (made by Hougen) using hand feed is significantly less for A710 Grade B than for A36 or A709 HPS70W steels.

# PROGRESS REPORT FOR THE QUARTER ENDING JUNE 2006

Project Title: Shrp Products Evaluation And Ltp Support		Today's Date: 7/13/2006					
		Function Code: IHR-R19					
		Project Number:					
QPR Author Name: Tom Winkelman		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 782 - 2940    % Project Completed: 80%				JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Attend National and Local SHRP/LTPP meetings		1/1990	12/2009	I	I	I	I
Task 2: Maintenance of LTPP test sections within Illinois		1/1990	12/2009	I	I	I	I
Task 3: Performance testing of LTPP test sections within Illinois		1/1990	12/2009	I	I	I	I
Task 4:		/	/				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Tom Winkelman telephone: (217) 782 - 2940 e-mail: winkelmantj@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		<b>Co-Investigator Name/Contact:</b>  telephone: (    )    - e-mail:			
Description of Research: The objective of this study is to evaluate those Strategic Highway Research Program (SHRP) products that have been identified as having potential of being a benefit to the department. The primary benefit of this study will be the identification and implementation of those SHRP products that will be cost effective to the department resulting in cost-savings, increased service life, and/or safety improvements.				Keywords:			
<b>Technical Review Panel Names:</b>  David L. Lippert	<b>TRP Telephone:</b> (    )    - (217) 782 - 6732 (    )    - (    )    - (    )    - (    )    - (    )    - (    )    -	<b>TRP Email:</b>  lippertdl@dot.il.gov	<b>Meeting Dates:</b> /   / /   / /   / /   / /   / /   / /   /	<b>Minutes Available?</b>			
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: Performance Data Manuals of Practice New Procedures					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.



## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Shrp Products Evaluation And Ltpb Support	Today's Date: 7/13/2006
	Function Code: IHR-R19

Progress to Date (Limit narrative to what fits on this page):

2004 1<sup>st</sup> Quarter  
Laboratory testing was completed for cores taken from Test Sections 175151, 179267, 175849, and 175423. Test results were reported to Stantec in February. Stantec performed a final round of testing for Test Section 175908 on Illinois Route 13 in District 9 as this section will be dropped from the program this summer.

2004 2<sup>nd</sup> Quarter  
Traffic control was established for annual testing at 6 test section locations. Construction was started and completed for the new WIM Scale on Interstate 57 at the SPS-6 site in Pesotum.

2004 3<sup>rd</sup> Quarter  
Traffic control was established for annual testing at 3 test section locations. The I-57 WIM scale was ground for smoothness, and the pavement profile was checked. The annual Illinois update meeting was held on August 27.

2004 4<sup>th</sup> Quarter  
International Road Dynamics was selected as the contractor to install the I-57 WIM scale.

2005 1<sup>st</sup> Quarter  
An on-site meeting was held with IRD to review the selected WIM installation site. Work has progressed on the necessary items needed to complete the installation. A letter was sent to each of the Districts with an LTPP site asking for future rehabilitation plans and asking them to update the BMPR with any maintenance activities to the sites. An LTPP project update presentation was made at the Pavement Engineers meeting.

2005 2<sup>nd</sup> Quarter  
Work progressed on the requirements and scheduling of the WIM installation on Interstate 57 at Pesotum. A meeting was held with the RSC to coordinate the materials action plan for sampling of the SPS-6 site on Interstate 57. This sampling was postponed until summer 2006.

2005 3<sup>rd</sup> Quarter  
The WIM installation and calibration was completed in late July through early September. Traffic control was coordinated for the RSC at the SPS-6 site as well as sites in District 4 and 2.

2005 4<sup>th</sup> Quarter  
No activity to report.

2006 1<sup>st</sup> Quarter  
Maintenance activities were recorded for the SPS-6 sections on Interstate 57 near Champaign. The coring and data collection activities for the SPS-6 Materials Action Plan were scheduled for April.

2006 2<sup>nd</sup> Quarter  
The SPS-6 Materials Action Plan was completed in April.

# PROGRESS REPORT FOR THE QUARTER ENDING: JUN 2006

Project Title: <b>Integral Abutment Bridges</b>			Today's Date: 7/14/06					
			Function Code: IHR-R20					
			Project Number: ITRC      FY 2006					
QPR Author Names: Christopher Hahin			Estimated Dates		Calendar Year: 2006			
Telephone: (217) 782-0574	% Project Completed: 79%				JAN	APR	JUL	OCT
Task Title			Start	Complete	MAR	JUN	SEP	DEC
Task 1: Attach gages on piles, decks, diaphragms and girders			7/00	6/02	C			
Task 2: Collect strain gage & tilt sensor data			7/01	12/02	C			
Task 3: Propose and investigate improved geometry and details			1/02	9/03	C			
Task 4: Prepare Interim Reports			5/02	3/06	I	I		
Task 5: Cyclic yielding of embedded subsize piles			10/02	7/04	C			
Task 6: Recommend Changes to ILDOT Design Specs			12/02	6/07	I	I		
Task 7: Select candidate experimental bridge			7/05	9/06	I	I		
Task 8:			/	/				
Task 9:			/	/				
Task 10:			/	/				
<b>Principal Investigator Name/Contact:</b> Christopher Hahin, PE telephone: (217) 782 – 0574 e-mail:			P. I. Organization Name/Address: IL DOT Bureau of Materials & Research Springfield, IL 62704		<b>Co-Investigator Name/Contact:</b>  telephone: (    )    - e-mail:			
Description of Research: In an integral abutment bridge, thermal expansion and contraction is absorbed by the piles supporting the abutment instead of expansion joints. In this project, integral abutments are instrumented with strain gages installed on the piles of various bridges at locations throughout Illinois at 8 different depths to observe the stresses induced by expansion and contraction. Other gages were mounted in the deck, on girders, and at the interface between the abutment and abutment diaphragm where gages are installed on the vertical reinforcement bars. Additional study will include improvement of present designs to decrease cyclic stresses sustained by pilings and abutment diaphragm.					Keywords: integral abutments; strain gages; driven piles; thermal expansion; contraction			
<b>Technical Review Panel Names:</b> Kevin Reichers David Greifzu Ralph Anderson		<b>TRP Telephone:</b> (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) - (    ) -		<b>TRP Email:</b>		<b>Meeting Dates:</b> / / / / / / / / / / / / / / / /		<b>Minutes Available?</b>
Short Title & Date of Reports Available:				End User(s) and Result(s) Expected: Bureaus of Bridges & Structures				

Instructions for each field appear at the bottom of the screen. For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: <b>Integral Abutment Bridges</b>	Today's Date: 7/14/06 Function Code: IHR-R20
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><i>Sep 2002:</i> Discussions with personnel from the Bureau of Bridges &amp; Structures (BBS) indicated their desire to have the bridge approach slab connected to the abutment. Because of our concerns about contraction during cold weather, there should be an ability for the slab to remain connected, but provide expansion with lubricated dowels or other types of connectors. Pile behavior in various soils and their unpredictability have caused concern as to undetected cracking of pile caps, since they are not visible for inspection. Discussions were conducted about embedding small I-beams in concrete blocks of 8 cu ft, and cycling them to slightly beyond their yield strength. This would reveal how cracking spreads in the concrete. Further discussions were held with Kevin Reichers and Salah Khayyat of BBS regarding our proposals to separate the pile cap from the beam end cap with lubricated plates of austenitic stainless steel (AISI Types 304 or 316), permitting very substantial movements without creating any yielding phenomena in the pile cap.</p> <p><i>Dec 2002:</i> Preliminary outline developed for interim report. Construction and testing of small beam embedded in rigid concrete blocks delayed until Spring 2003.</p> <p><i>Mar 2003:</i> Work commenced on the interim report, summarizing the various characteristics of each site, outputs of strain gages at certain times of the year, and daily fluctuations. Test results indicate that behavior of the pile is dependent on the soil pressures of the subsoil horizons, and is not always a cantilever-shaped deformation with a point of fixity at a particular depth. In the Tennessee design, select backfill is used to obtain a more uniform deformation, although they reported yielding at the pile end cap.</p> <p><i>Jun 2003:</i> An interim draft report summarizing previous work has been prepared, and is presently undergoing review and revision. Completed draft for final peer review scheduled for Sep 2003.</p> <p><i>Sep 2003:</i> Work on this project delayed due to higher priority efforts in D-1, D-2, D-4 and D-8.</p> <p><i>Dec 2003:</i> Work delayed due to transfer of associate investigator Volkman to D-8.</p> <p><i>Mar 2004:</i> Work delayed due to higher priority Departmental work.</p> <p><i>Jun 2004:</i> Work delayed due to higher priority Departmental work.</p> <p><i>Oct 2004:</i> Work delayed due to higher priority Departmental work. Proposed semi-integral design should be incorporated into an Innovative Bridge project in the near future, preferably in D-8 since the previous assistant investigator transferred there. This recommendation will be incorporated into the final report to provide continuity to carry out these concepts.</p> <p><i>Dec 2004:</i> Work delayed due to higher priority Departmental work.</p> <p><i>Mar 2005:</i> Work delayed due to higher priority Departmental work.</p> <p><i>June 2005:</i> Inquiry made to David Greifzu of the Bureau of Bridges as to whether an integral abutment bridge design could incorporate designs recommended in this study as an experimental feature.</p> <p><i>Sep 2005:</i> Work delayed due to higher priority Departmental work in D-1.</p> <p><i>Dec 2005:</i> Work delayed due to higher priority Departmental work in D-1.</p> <p><i>Mar 2006:</i> After discussion with Bureau of Bridges, the choice of an experimental bridge to be coordinated with W. Kramer and K. Reichers to incorporate modifications of standard IL practices for integral bridges.</p> <p><i>Jun 2006:</i> No progress on this work unit due to higher priority work for D-1, Bureaus of Operations; Design.</p>	

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TRANSPORTATION**

## PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Characterization of Illinois Aggregates for Subgrade Replacement and Subbase		Today's Date: 06/30/2006	
		Function Code: R27	
		Project Number: R 27-1	
QPR Author Name: Erol Tutumluer		Estimated Dates	
Telephone: (217) 333 - 8637	% Project Completed: 5%	Fiscal Year: 2006	
		JUL	OCT
		JAN	APR
Task Title		Start	Complete
Task 1: Characteristics of Illinois Aggregates Used for Subgrade Replacement and Subbase		01/2006	06/2006
Task 2: Development of Laboratory Aggregate Test Matrix		03/2006	06/2006
Task 3: ERI Atterberg Limits, Moisture-Density, IBV, and Shear Strength Tests		06/2006	12/2006
Task 4: UIUC Aggregate Shape, Permanent Deformation, and Directional Modulus Laboratory Tests		06/2006	09/2007
Task 5: Field Test Study and Evaluation of Field Performances		06/2007	12/2007
Task 6: Establishing Thickness Correlations with Aggregate Properties		09/2007	03/2008
Task 7: Final Report and Implementation		03/2008	06/2008
Task 8:		/	/
Task 9:		/	/
Task 10:		/	/
<b>Principal Investigator Name/Contact:</b> Erol Tutumluer telephone: (217) 333 – 8637 e-mail:tutumlue@uiuc.edu		<b>Co-Investigator Name/Contact:</b> Abbas A. Butt telephone: (217) 356 - 5945 e-mail:eri@erikuab.com	
<b>Description of Research:</b> The overall objective in this project is to characterize strength, stiffness, and deformation behavior of various types and qualities of aggregate commonly used in Illinois for subgrade replacement and subbase. The project focus is on pavement construction working platform issues. The project will develop aggregate thickness correlations with aggregate properties to modify and improve the thickness requirement curve in Figure A-2 of the Subgrade Stability Manual based on laboratory and field performances. This way, aggregate characteristics will also be used when determining cover thicknesses.		<b>Keywords:</b> Aggregate cover; subgrade replacement; subbase; aggregate type, quality, and properties; subgrade stability	
<b>Technical Review Panel Names:</b> Riyad M. Wahab Gregory B. Heckel William M. Kramer Terry L. McLeary Raymond J. Seneca Sheila A. Beshears Thomas A. Ripka Edward M. Frank Brian Rice		<b>TRP Telephone:</b> (217) - ( ) - ( ) - ( ) - ( ) - ( ) - ( ) - ( ) - ( ) -	<b>TRP Email:</b> Riyad.Wahab@illinois.gov Gregory.Heckel@illinois.go William.Kramer@illinois.go Terry.McCleary@illinois.go Raymond.Seneca@illinois.g Sheila.Beshears@illinois.g Thomas.Ripka@illinois.gov Edward.Frank@illinois.gov brice@material-service.com
<b>Meeting Dates:</b> 05/11/2006 / / / / / / / / / / / / / /		<b>Minutes Available?</b> Yes	
<b>Short Title &amp; Date of Reports Available:</b>		<b>End User(s) and Result(s) Expected:</b> Economize the use of aggregate by either reducing thickness or avoiding failure due to poor agg.	

Instructions for each field appear at the bottom of the screen.

### QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Characterization of IL Aggregates for Subgrade Replacement and Subbase	Today's Date: 06/30/2006 Function Code: R27-1
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>The first Technical Review Panel (TRP) meeting was held at ATREL on May 11, 2006 to revise and finalize the project scope and work plan. Information was gathered on the types, sources, and properties of aggregates primarily used in Illinois for subgrade replacement and subbase. Accordingly, it was primarily decided to use limestone and dolomite crushed aggregates and one uncrushed gravel in the study. The project focus was decided to be on pavement construction working platform issues. Therefore, evaluating RAP/natural aggregate mixtures and benefits to long-term pavement performance are beyond the scope of this project.</p> <p>The testing program was discussed and decided to focus on dense graded aggregates to develop various correction factors for the determination of aggregate working platform thickness. Based on IDOT Standard Specifications, CA-6 gradation often required for constructing aggregate layers as subgrade replacement and subbase was decided to be studied. An experimental test matrix was developed and finalized for laboratory tests to be conducted at the Engineering Research International (ERI) and the University of Illinois ATREL facilities. Specific tests, test procedures, and testing ranges were established in the revised work plan for evaluating major aggregate properties to primarily influence strength, modulus, and deformation behavior. These major properties include: [1] fines content, [2] PI or plasticity of fines, [3] shape (flatness and elongation), angularity and surface texture, and [4] moisture content and dry density (compaction properties).</p> <p>The aggregate needs and quantities of the limestone, dolomite, and uncrushed gravel aggregate materials were reported to the IDOT BMPR in late May 2006. Currently, the project investigators are expecting to receive the aggregate material shipment for the ERI and UIUC laboratory testing research programs to initiate.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Nighttime Construction: Evaluation Of Lighting Glare For Highway Construction In Illinois		Today's Date: 06/30/2006	
		Function Code: R27	
		Project Number: R 27-2	
QPR Author Name: Khaled El-Rayes		Estimated Dates	
Telephone: (217) 265 - 0557    % Project Completed: 25%		Fiscal Year: 2006	
		JUL	OCT
		JAN	APR
Task Title	Start	Complete	
Task 1: Conduct Literature Review	01/2006	07/2006	SEP    DEC    MAR    JUN
Task 2: Develop Practical Tool to Measure and Quantify Glare and Light Trespass	06/2006	12/2006	C    C
Task 3: Recommend Lighting Arrangement to Reduce Glare and Light Trespass	01/2007	06/2007	I    I
Task 4: Conduct Field Evaluation of Selected Lighting Arrangements	07/2007	10/2007	I    I
Task 5: Make Final Recommendations	08/2007	10/2007	I    I
Task 6:	/	/	
Task 7:	/	/	
Task 8:	/	/	
Task 9:	/	/	
Task 10:	/	/	
<b>Principal Investigator Name/Contact:</b> Khaled El-Rayes telephone: (217) 265 - 0557 e-mail: elrayes@uiuc.edu		P. I. Organization Name/Address: University of Illinois at UC 205 N. Mathews Ave. Urbana, IL 61801	
<b>Co-Investigator Name/Contact:</b> Liang Liu telephone: (217) 333 - 6951 e-mail: lliu1@uiuc.edu		Description of Research: Nighttime highway construction is advocated as a way to mitigate the impact of construction operations on the traveling public, shorten the duration of construction operations, and reduce the potential for work zone accidents. However, nighttime construction operations may in fact be more hazardous for both drivers and construction personnel. The utilization and placement of lighting equipment to illuminate the work zone may cause glare for drivers and/or equipment operators. The proposed study will focus on evaluating and recommending acceptable levels of glare and developing practical tool for measuring and controlling glare in nighttime highway construction.	
Keywords: nighttime construction, highway lighting, glare, lighting.		Technical Review Panel Names: Huckaba, Dennis Brand, Mike Birch, Jeff Haasis, Sharon Jung, Herb Mueller, Matt Schoenherr, Jim Seppelt, Mark Staggs, Mike	
TRP Telephone: (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    -		TRP Email: huckabada@dot.il.gov brandmd@dot.il.gov birchjl@dot.il.gov haasissl@dot.il.gov junghk@dot.il.gov muellermw@dot.il.gov schoenherrja@dot.il.gov seppeltme@dot.il.gov mike.staggs@fhwa.dot.gov hal.wakefield@fhwa.dot.gov	
Meeting Dates: 04/25/2006 /    / /    / /    / /    / /    / /    / /    /		Minutes Available? Yes	
Short Title & Date of Reports Available: Interim Report 1: Literature Review July, 31 2006		End User(s) and Result(s) Expected: Literature Review Glare measurement recommendations Recommend lighting arrangement	

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of Lighting Glare For Nighttime Highway Construction	Today's Date: 06/30/2006
	Function Code: R27-2
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>A comprehensive literature review has been conducted to identify existing types of glare and its effects on drivers and construction workers during nighttime highway construction work.</p> <p>The literature review report focused on two main types of relevant glare (i.e., discomfort and disabling) and the report provided a summary of existing methods to measure and quantify each of these two types of glare. Moreover, the report explored and highlighted existing DOT standards that focus on the impact of glare and recommended measures to control it in roadway lighting.</p> <p>In addition, several site visits were conducted to study and measure glare caused by the utilized nighttime lighting equipment on the construction site.</p>	



# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Design And Concrete Material Requirements For Ultra-Thin Whitetopping		Today's Date: 06/30/06					
		Function Code: R27					
		Project Number: R 27-3A					
QPR Author Name: Jeffery R. Roesler		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 265 - 0218	% Project Completed: 20%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: University of Cincinnati Collaboration		04/2006	12/2006				I
Task 2: Review existing UTW and WT concrete mix designs		04/2006	09/2006				I
Task 3: Develop and Implement Laboratory Testing Program		04/2006	09/2006				I
Task 4: Advanced Stress Analysis of UTW		05/2006	12/2006				I
Task 5: UTW Guidelines		07/2006	07/2007				I
Task 6: Modified UTW procedure for Illinois		04/2007	12/2007				
Task 7: Final Report		09/2007	12/2007				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Jeffery R. Roesler telephone: (217) 265 - 0218 e-mail: jroesler@uiuc.edu		P. I. Organization Name/Address: University of Illinois 205 N. Mathews Ave, MC-250, Urbana, IL, 61801		<b>Co-Investigator Name/Contact:</b>  telephone: (   )   - e-mail:			
Description of Research: The objective of this research project is to provide IDOT with an UTW thickness design method and guidelines for UTW design, concrete material selection, and construction practices. Existing procedures for UTW will be reviewed in collaboration with Dr. Ioannides from UC. The specific tasks of this project are to evaluate the effects of fibers and concrete material properties on slab size and thickness requirements. Factors such as existing condition of the AC, AC thickness, interface preparation and strength, and saw-cut timing and depth will be evaluated and guidelines established.				Keywords: Ultra-thin whitetopping, concrete, design, analysis, fibers			
<b>Technical Review Panel Names:</b> Tom Winkelman (Chair) Kevin Burke Doug Dirks Scott Lackey David Lippert Randy Riley		<b>TRP Telephone:</b> (217) 782 - 2940 (217) 785 - 5048 (217) 782 - 7208 (217) 466 - 7263 (217) 782 - 6732 (217) 793 - 4933 (   )   - (   )   -	<b>TRP Email:</b> winkelmantj@dot.il.gov burke@dot.il.gov  dirksda@dot.il.gov lackey@dot.il.gov lippertdl@dot.il.gov pccman@insightbb.com	<b>Meeting Dates:</b> 03/17/06 / / / / / / / / / / / /		<b>Minutes Available?</b> Yes	
Short Title & Date of Reports Available: Project Workplan, April 2006			End User(s) and Result(s) Expected: IDOT, state agencies, consultant UTW design guide and concrete material requirements				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Design And Concrete Material Requirements For Ultra-Thin Whitetopping	Today's Date: 06/30/06 Function Code: R27-3A
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>During the first quarter of this new project, several of the tasks listed above were started. The PI is collaborating with Dr. Ioannides from the University of Cincinnati, who is primarily responsible for a critical review of the existing design methods. A preliminary literature review has also been conducted by the PI to review factors affecting the performance/failure of UTW.</p> <p>Concrete mixture proportions and strength data from UTW projects in the state of Illinois have been collected from TRP chair Tom Winkelman along with distress surveys from the same projects. IDOT has also identified several candidate projects (a minimum of two) that they will conduct FWD testing this summer (2006). The objective of the FWD testing is to acquire backcalculated layer moduli (concrete and asphalt) and load transfer efficiency across the thin concrete slabs joints for one UTW section with normal concrete and the other UTW section with structural fibers.</p> <p>From the field concrete mixture proportions, a laboratory testing factorial has been developed based on six concrete mixture designs. These mixture designs primarily address one mechanical property, strength. UTW concrete mixture designs were selected to achieve high early strength concrete, high strength concrete, normal strength concrete, concrete with fly ash, and fiber-reinforced concrete. The laboratory testing factorial includes tensile strength, compressive strength, elastic modulus, flexural strength, drying shrinkage, fracture properties (initial and total fracture energy and critical crack tip opening displacement), and interface strength. The fracture properties are key inputs into fracture-based analysis that will determine the viability of fibers in UTW concrete mixtures and the failure modes of UTW slabs. Discrete fibers in low volume fractions do not alter the tensile strength of the concrete matrix but do affect the post-cracking strength of the material. If fibers are going to be considered, fracture properties and a model that accounts for the FRC softening behavior must be considered. This is especially critical in thin overlays where ductile behavior is much more desirable.</p> <p>Preliminary testing of a composite beam (3"x3"x15" of concrete over 3"x3"x15" of AC) supported by an elastomeric pad have been completed. A normal and fiber reinforced concrete mixture has been tested over an AC specimen with and without a crack. The preliminary results of the tests showed the peak loads between normal and FRC were approximately the same. The fracture energy was 33% greater for fiber reinforced concrete when the AC layer had no cracking in it. However, the fracture energy was 200% greater for the FRC mixture when the AC layer had a crack (notch) in it. It is expected that fibers become even more beneficial to UTW designs when cracking distress levels or severity increase on the existing AC pavement.</p> <p>The development of a new softening model for FRC, in an existing finite element software, to account for the behavior of UTW has begun. Several new components in this UTW model are how to handle the contribution of fibers in the concrete softening zone, modeling of the 2-D composite beam test, and finally a 3-D model composite slab model. Preliminary modeling of 3-point bending test with fibers has been completed and the new model appears to predict the measured behavior of FRC beams. A 2-D composite beam model supported by an elastic foundation is currently being developed in order to validate the preliminary laboratory results.</p> <p>One task was added this quarter by the PI. The University of Illinois Division of Parking decided to build a 3.5" UTW with 4'x4' panels on one of their parking lots (E-15) on campus. The UIUC team decided to observe the construction of this UTW parking lot in June 2006. Pictures of the distressed AC parking lot were taken. Strength and fracture specimens were collected for 28-day testing in the UIUC laboratory. The concrete mixture proportions were documented which included the use of a structural synthetic fiber. The laboratory testing data will be provided to IDOT as part of this report. It may be possible to FWD test this parking lot to evaluate the effects of fibers on the joint load transfer efficiency.</p> <p>Work that is anticipated this quarter will be to begin the laboratory testing phase, complete the 2-D composite beam model, and analyze the field FWD data. A meeting with the TRP members is also planned for the 1<sup>st</sup> quarter of FY2007.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Evaluation of UTW and Whitetopping Design Procedure		Today's Date: 06/28/06					
		Function Code: R27					
		Project Number: R 27-3B					
QPR Author Name: Anastasios M. Ioannides		Estimated Dates		Fiscal Year: 2006			
Telephone: (513) 556 - 3137	% Project Completed: 20%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Evaluate and document existing UTW design procedures		04/01	08/31				I
Task 2: Summary of Whitetopping and UTW field sections		09/01	12/31				
Task 3: Final Report		01/01	03/31				
Task 4: Final Report Review and Revision		04/01	06/30				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b>  Anastasios M. Ioannides telephone: (513) 556 - 3137 e-mail: ioanniam@uc.edu		P. I. Organization Name/Address: University of Cincinnati PO Box 21022, OH 45221-0222		<b>Co-Investigator Name/Contact:</b>  telephone: (   )   - e-mail:			
Description of Research: This project is part of an effort to meld the current empirical and theoretical knowledge of pavements with UTW and conventional PCC overlay design with Illinois-specific experience to develop tools and guidelines to effectively design these overlay types for IDOT's use. Existing UTW design procedures will be critically reviewed for potential adoption for IDOT, and in collaboration with ICT personnel, a list will be compiled of all available whitetopping and UTW field sections located in Illinois. Recommendations will be formulated on the most viable UTW design procedure for IDOT's use and any needed changes.				Keywords: Whitetopping, UTW, mechanistic-empirical design, concrete pavements			
<b>Technical Review Panel Names:</b> Tom Winkelman (Chair) Kevin Burke Doug Dirks Scott Lackey David Lippert Randy Riley		<b>TRP Telephone:</b> (217) 782 - 2940 (217) 785 - 5048 (217) 782 - 7208 (217) 466 - 7263 (217) 782 - 6732 (217) 793 - 4933 (   )   - (   )   -		<b>TRP Email:</b> winkelmantj@dot.il.gov burke@dot.il.gov  dirksda@dot.il.gov lackey@dot.il.gov lippertdl@dot.il.gov pccman@insightbb.com		<b>Meeting Dates:</b> 03/17/06 / / / / / / / / / / / /	
<b>Minutes Available?</b> Yes							
Short Title & Date of Reports Available: PPT Presentation: Workplan 03/17/06			End User(s) and Result(s) Expected: IDOT, ACPA Final Report with Recommendations for revised whitetopping procedure				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of UTW and Whitetopping Design Procedure	Today's Date: 06/22/06 Function Code: R27-3B
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>During the Quarter of 04/01/06-06/30/06, our first under this Contract, the Principal Investigator has initiated a critical review of existing UTW design procedures for potential adoption for IDOT. The literature has been assembled and its review and evaluation is well under way. A thorough understanding of the prevailing design practices around the USA (and occasionally abroad) is pursued, and this has been steadily progressing with encouraging outcomes. The focus, of course, are the following design procedures, as specified in the proposal: (1) ACPA's UTW procedure, (2) the Federal Highway Administration's (FHWA's) UTW Design guide and software (pending availability), and (3) Colorado's thin whitetopping design procedure. The preliminary finding of work conducted this Quarter is that these procedures share a significant number of features, evincing that they represent a national effort with few local characteristics added on a case by case basis. Moreover, just as they share in their strengths, all procedures reviewed to date appear to share the same persistent weaknesses, especially those related to the inability of current mechanistic-empirical design procedures to accommodate such an unconventional structural system as UTW and whitetopping. These weaknesses are noted as encountered and will be useful in formulating recommendations for necessary changes as required by Task 3 of this Project. In order to remain within the scope of the work outlined in the proposal, the following features of each design procedure are specifically assessed: (a) traffic; (b) climate; (c) materials, esp. concrete and subgrade; (d) pavement pre-overlay condition; (e) overlay thickness and joint design; (f) interface bonding; (g) analytical techniques; (h) performance criteria; (i) reliability.</p> <p>During the performance of this work, the Principal Investigator has remained in close consultation with Prof. Jeffery Roesler at UIUC, for the purpose of coordination of activities.</p>	

## PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

[illegible]

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Radiation Detection Pilot Program	Today's Date: 06/29/2006
	Function Code: R27-4
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><b>Task 1. Design and Deployment of Pilot System</b></p> <p>Prototypes have been designed and built by the equipment manufacturer without cost to the State or the University for the purpose of the pilot program.</p> <p>The design was presented to the Technical Review Panel on 24-May-2006. Comments were received on the design, but the committee decided to postpone installation until the system could be tested by the RAP (Radiological Assistance Program) Team at Argonne National Laboratory.</p> <p>A system installation document is being written for review by IDOT personnel and the Technical Review Panel.</p> <p><b>Task 2. Monitoring of Pilot System</b></p> <p>The system is not installed and monitoring has not yet begun.</p> <p><b>Task 3. Testing of System by RAP Team</b></p> <p>A meeting was held on 20-Jun-2006 to discuss testing by the RAP team. A testing protocol is under development. Input from the Domestic Nuclear Detection Office of the Department of Homeland Security will be sought. Testing is planned for July 2006.</p> <p><b>Task 4. Presentation of Results</b></p> <p>Three oral presentations with slides and one draft proposal were prepared under this contract as follows.</p> <p>DNDO Proposal 8-Feb-2006 Presentation to Illinois Terrorism Task Force 19-Jan-06 Presentation to ITTF Subcommittee 24-May-2006 Presentation to RAP Team 20-Jun-2006</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Bus Operations On Highway Shoulders		Today's Date: 7/19/06					
		Function Code: R27-5					
		Project Number:					
QPR Author Name: J. Schofer		Estimated Dates		Fiscal Year: 2006			
Telephone: (847) 491 - 8795    % Project Completed: 1%				JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Define background and framework.		/	/				I
Task 2: Review literature and practice.		/	/				
Task 3: Build applications database classified by key variations		/	/				
Task 4: Conduct case studies		/	/				
Task 5: Prepare and deliver final report		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Joseph Schofer telephone: (847) 491 - 8795 e-mail: j-schofer@northwestern.edu		P. I. Organization Name/Address: Transportation Center Northwestern University 2145 Sheridan Road Evanston, IL 60208		<b>Co-Investigator Name/Contact:</b>  telephone: (    )    - e-mail:			
Description of Research: This research will identify the potential for, and obstacles to, bus operations on roadway shoulders (BOS) to provide a level of service advantage to bus transit. This will be accomplished by conceptual modeling to identify issues and factors, review of literature and documented experience, interviews with representatives of agencies operating BOS, development of case studies, and interpretation of results.				Keywords: public transportation, bus, bus rapid transit, freeway operations, bus priorities			
<b>Technical Review Panel Names:</b> David Tomzik Charles Abraham		<b>TRP Telephone:</b> (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    - (    )    -		<b>TRP Email:</b> David.Tomzik@Pacebus.com Charles.Abraham@illinois.g		<b>Meeting Dates:</b> /    / /    / /    / /    / /    / /    / /    /	
<b>Minutes Available?</b>		<b>Short Title &amp; Date of Reports Available:</b>					
<b>End User(s) and Result(s) Expected:</b> Recommendations for implementation of BOS operations for transit providers and transportation management and planning agencies							

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Bus Operations On Highway Shoulders	Today's Date: 07/19/06 Function Code: R27-5
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Although we did not receive a notice to proceed, we did get a revised budget for this work in mid-June, and the PI has signed off on the revisions. A spending account has not been established pending final contract agreement.</p> <p>A meeting with Charles Abraham (IDOT) and David Tomzik (Pace) presumed members of the Technical Review Panel, is being scheduled for later in July. Northwestern's Transportation Library has conducted a preliminary literature search, and relevant documents are being assembled and reviewed. A revised schedule will be prepared after this meeting.</p> <p>An initial list of regions where BOS operations have been conducted or considered has been assembled. The perspective of the work has been extended to include a variety of bus priority treatments that may serve as alternatives or complements to BOS. This includes more general bus rapid transit concepts.</p> <p>The conceptual model called for in task 1 is being formulated.</p>	



# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Internet-Based Flood-Peak Discharges Determination For Rural Streams In Illinois—StreamStats		Today's Date: 06/26/2006					
		Function Code: R					
		Project Number: R 27-6					
QPR Author Name: David Soong		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 344 - 0037	% Project Completed: 25%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Review National Hydrography Dataset (100K streams)		03/2006	03/2006			C	C
Task 2: Review Digital Elevation Model (DEM)		03/2006	05/2006			C	C
Task 3: Develop project coverage		03/2006	04/2006			C	C
Task 4: Data preparation (7 sub-tasks)		04/2006	09/2006				I
Task 5: Populate StreamStats database for Illinois		05/2006	07/2006				I
Task 6: Custom programming from ESRI for basin length		03/2006	08/2006				I
Task 7: Testing by regions for basin characteristics at gaged and ungaged sites		09/2006	09/2007				
Task 8: Analysis of variance for flood frequencies at gaging stations		09/2006	09/2007				
Task 9: documentation		06/2006	09/2008				I
Task 10: QA/QC, metadata and setup ArcIMS server		03/2006	10/2007				I
<b>Principal Investigator Name/Contact:</b>  Robert H. Holmes, Jr. telephone: (217) 344 - 0037 e-mail: bholmes@usgs.gov		P. I. Organization Name/Address: USGS - IWSC 1201 West University Ave. Urbana, Ill. 61801		<b>Co-Investigator Name/Contact:</b>  telephone: (   )   - e-mail:			
Description of Research: An automated Internet Map Server (IMS) tool, Illinois StreamStats, that makes peak flood discharge computations at gaged and ungaged rural sites consistent, easy to determine, and publicly available to the users in Illinois will be developed and served. Illinois StreamStats will provide a point and click interface to determine watershed delineations and basin characteristics. StreamStats is interfaced with the National Flood Frequency program to return peak flood discharges at various frequencies.				Keywords: Flood-frequencies, rural streams, Illinois, internet, StreamStats			
<b>Technical Review Panel Names:</b> Matthew O'Connor Arlan Juhl Audrey Ishii Mark Gawedzinski Neil Vanbebber  David Soong		<b>TRP Telephone:</b> (217) 785 - 2917 (217) 782 - 4437 (217) 344 - 0037 (217) 782 - 8582 (217) 782 - 2714 (   )   - (217) 344 - 0037 (   )   -		<b>TRP Email:</b> Matthew.OConnor@illinois.gov or ARLAN.JUHL@illinois.gov alishii@usgs.gov Mark.Gawedzinski@illinois.gov Neil.Vanbebber@illinois.gov dsoong@usgs.gov		<b>Meeting Dates:</b> 02/15/2006 / / / / / / / / / / / /	
<b>Minutes Available?</b> Yes							
<b>Short Title &amp; Date of Reports Available:</b> N \ A		<b>End User(s) and Result(s) Expected:</b> Hydraulic designers in Illinois \ automated method of estimating discharges					

Instructions for each field appear at the bottom of the screen.

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Internet-Based Flood-Peak Discharges Determination For Rural Streams	Today's Date: 06/26/2006 Function Code: R27-6
Progress to Date (Limit narrative to what fits on this page):	
<p>Task 1. Completed. The enhanced National Hydrography Dataset (NHD) provided to the USGS by Ann Holtrop at the Illinois Natural History Survey, IDNR Watershed Protection Section was reviewed and modified as necessary. Arc Hydro Tools require a dendritic stream network for processing. Ms. Holtrop had already prepared a dendritic for an IDNR project. Sharpe found Holtrop's dataset to be well done and ready for use in Arc Hydro Tools.</p> <p>Task 2. The current National Elevation Dataset (NED) was downloaded, the tiles merged, and the data projected. Tile edges were examined to make sure elevation values were consistent. The NHD was overlayed on the NED and it was determined that there was a good match. The NED is not used directly in the Arc Hydro Tools but is used in the initial processing to develop a new DEM that is washed and has burned streamlines (hydro-corrected DEM).</p> <p>Task 3. The coverage projections are completed.</p> <p>Task 4. a.-f. Data preparation for the Kaskaskia River watershed has been completed as a test case. The task was requested by IDOT for a demonstration at the next technical review panel meeting.</p> <p style="padding-left: 40px;">a. All required data for processing through Arc Hydro Tools have been obtained. These data include the NED, the NHD, and the Watershed Boundary Dataset (WBD). The HUC processing units have been derived from the WBD.</p> <p>Task 5. Basin and flow characteristics have been entered into the StreamStats Database. The upper and lower 95% confidence intervals have not been entered.</p> <p>Task 6. Contract discussions regarding basin length have been held with ESRI and the StreamStats staff. The program for basin length is an Arc macro script that will be converted to Arc Hydro Tools by the StreamStats staff, then incorporated into StreamStats by ESRI through the existing contract management staff.</p> <p>Task 7. Not initiated.</p> <p>Task 8. Not initiated.</p> <p>Task 9. Not initiated.</p> <p>Task 10. A comparison of drainage area (DA) between manual delineation (in USGS files), and Watershed Boundary Dataset (WBD) delineated watershed areas should be completed. If significant differences are noted, an analysis of DA to be used in regression equation will be necessary.</p> <p>Data entered into the StreamStats Database have been checked. The upper and lower 95% confidence intervals are not easily derived using existing parameters and may require a re-run of the GLS program. The feasibility of this option is being reviewed.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Evaluation Of Hot-Mix Asphalt Sampling Techniques		Today's Date: 06/30/2006	
		Function Code: R27	
		Project Number: R 27-8	
QPR Author Name: Mostafa A Elseifi		Estimated Dates	
Telephone: (309) 677 - 2716    % Project Completed: 10%		Fiscal Year: 2006	
		JUL	OCT
		JAN	APR
Task Title	Start	Complete	SEP
Task 1: Literature Review	06/2006	08/2006	DEC
Task 2: Field Visits and Scan of Practice	07/2006	03/2007	MAR
Task 3: Draft Final Report	02/2007	04/2007	JUN
Task 4: Revised Final Report	04/2007	06/2007	
Task 5:	/	/	
Task 6:	/	/	
Task 7:	/	/	
Task 8:	/	/	
Task 9:	/	/	
Task 10:	/	/	
<b>Principal Investigator Name/Contact:</b> Mostafa Elseifi telephone: (309) 677 - 2716 e-mail: melseifi@bradley.edu		P. I. Organization Name/Address: Bradley University 1501W Bradley Avenue Peoria IL 61625	
<b>Co-Investigator Name/Contact:</b> telephone: (    )    - e-mail:		Description of Research: Insuring the integrity of hot mix samples is critical to assuring the quality of the completed product and complying with Federal requirements. Samples of asphalt mixture are currently taken at the hot mix plant without state supervision. Further, samples are taken from a truck where obtaining a representative sample can be difficult and easily subject to bias. The concept of moving the sample location to the job site offers the potential to address the weakness cited above. However, there are a number of different approaches, each with advantages and disadvantages. Research is needed to survey practice and arrange visits with practitioners in Illinois and other states.	
Keywords: HMA Sampling, Roadway Sampling		Technical Review Panel Names: James Trepanier Scott Lackey Abdul Dahhan William J. Pine Laura Shanley	
TRP Telephone: (217) 782 - 9607 (    ) - (    ) - (317) 486 - 2981 (217) 524 - 7269 (    ) - (    ) - (    ) -		TRP Email: james.trepanier.illinois.gov  bill.pine@heritage-enviro. laura.shanley@illinois.gov	
Meeting Dates: 05/31/2006 / / / / / / / / / /		Minutes Available? Yes	
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: Literature Review Final Report with recommendations Collected data during field visit	

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of Hot-Mix Asphalt Sampling Techniques	Today's Date: 06/30/2006
	Function Code: R27-8
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>A literature review is currently being conducted (Task 1). In agreement with the technical review panel, a questionnaire was prepared and sent to the different states for surveying the state of practice in HMA sampling techniques and QA/QC regulations (Task 2). States were given until July 7<sup>th</sup> to respond. Up to date, 15 states have responded and more states are expected to answer before the deadline. A second meeting on July 13<sup>th</sup> is scheduled with the TRP to discuss the results of the survey and the plan for the field visits.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Pier Scour Prediction In Cohesive Soils: Use Of EFA-SRICOS Method In Illinois		Today's Date: 07/06/2006	
		Function Code: R27	
		Project Number: R 27-19	
QPR Author Name: Timothy Straub		Estimated Dates	
Telephone: (217) 344 - 0047	% Project Completed: 0%	Fiscal Year: 2006	
		JUL	OCT
		JAN	APR
Task Title		SEP	DEC
		MAR	JUN
Task 1: Site Selection & Scour Measurement	Start: 08/2006 Complete: 06/2007		I
Task 2: Shelby Tube Sampling & SRICOS-EFA Prediction	07/2007 06/2008		I
Task 3: Report Preparation and Reviews	07/2008 06/2009		I
Task 4:	/ /		
Task 5:	/ /		
Task 6:	/ /		
Task 7:	/ /		
Task 8:	/ /		
Task 9:	/ /		
Task 10:	/ /		
<b>Principal Investigator Name/Contact:</b> Robert R. Holmes, Jr. telephone: (217) 344 - 0037 e-mail: bholmes@usgs.gov		<b>Co-Investigator Name/Contact:</b> Timothy D. Straub telephone: (217) 344 - 0037 e-mail: tdstraub@usgs.gov	
P. I. Organization Name/Address: USGS 1201 West University Ave Urbana, IL 61801		Description of Research: The Scour Rate In Cohesive Soils-Erosion Function Apparatus (SRICOS-EFA) Methodology provides a potentially useful methodology for assessing scour in cohesive sediments. Most methods for predicting pier scour use erodability estimates from data collected with cohesionless soils. These estimates generally overestimate the scour of cohesive soils and needed depth and cost of piers. The SRICOS-EFA method holds promise in addressing the issue of scour in cohesive sediments, but field validation data are limited. The overall objective of this study is to test and potentially validate or improve the SRICOS-EFA method for estimating scour depth of cohesive soils in Illinois streams.	
Keywords: Scour, Erosion, piers, cohesive, SRICOS, EFA			
<b>Technical Review Panel Names:</b> Matt O'Connor Bill Kramer Riyadh Wahab Neil Vanbebber Mark Gawedzinski Marshall Metcalf Frank Opfer Ron Wagoner	<b>TRP Telephone:</b> (217) 785 - 2917 (217) 782 - 7773 (217) 782 - 2704 (217) 782 - 2714 (217) 782 - 2799 (217) 782 - 6703 (618) 346 - 3182 (217) 466 - 7265	<b>TRP Email:</b> Matthew.OConnor@illinois.gov William.Kramer@illinois.gov Riyadh.Wahab@illinois.gov Neil.Vanbebber@illinois.gov Mark.Gawedzinski@illinois.gov Marshall.Metcalf@illinois.gov Francis.Opfer@illinois.gov Ronald.Wagoner@Illinois.gov	<b>Meeting Dates:</b> 06/07/2006 / / / / / / / / / / / /
<b>Minutes Available?</b> Yes			
Short Title & Date of Reports Available: Research Proposal		End User(s) and Result(s) Expected: IDOT engineers working with bridge scour \ improved method of predicting scour	

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Pier Scour Prediction In Cohesive Soils: EFA-SRICOS Method In Illinois	Today's Date: 07/06/2006
	Function Code: R27-19
Progress to Date (Limit narrative to what fits on this page):	
<p>The TRP met in Springfield to discuss the proposed work. This meeting was an opportunity for the TRP to identify points of discussion for the kickoff meeting. The kickoff meeting for the IDOT EFA-SRICOS study was held on June 7, 2006 at the IDOT District 6 building in Springfield, Illinois. Meeting notes and a revised proposal addressing questions and comments from the TRP were submitted during this quarter.</p>	
<p>Between the kickoff meeting and the August 1 Task I start date, the TRP will work with IDOT District staff to initiate the process of identifying potential testing sites (Site Selection within Task I) around the state. Information gathered within District offices will be collected by the TRP for site screening to be completed in conjunction with USGS.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Mechanistic-Empirical (M-E) Design Implementation & Monitoring For Flexible Pavements		Today's Date: 06/26/06					
		Function Code: R28					
		Project Number: R 28					
QPR Author Name: Marshall R. Thompson		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 3930	% Project Completed: 100%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Provide technical support and cooperate with IDOT concerning M-E flexible pavement design.		07/05	06/06	I	I	I	I
Task 2:		/	/				
Task 3:		/	/				
Task 4:		/	/				
Task 5:		/	/				
Task 6:		/	/				
Task 7:		/	/				
Task 8:		/	/				
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Marshall R. Thompson telephone: (217) 333 - 3930 e-mail: mrthomps@uiuc.edu		P. I. Organization Name/Address: Dept. of CEE University of IL @U-C		<b>Co-Investigator Name/Contact:</b> telephone: (   )   - e-mail:			
Description of Research: Mechanistic-Empirical (M-E) -based flexible pavement design concepts and procedures were developed in previous IHR Projects (IHR-510 and IHR-527) and have been implemented by IDOT. IDOT continues to support a variety of M-E design implementation and monitoring activities. The objective of this project is for University of Illinois Staff to continue to provide technical support and cooperate with IDOT in these activities.				Keywords: Flexible Pavements; Mechanistic-Empirical Design			
<b>Technical Review Panel Names:</b> David Lippert	<b>TRP Telephone:</b> (217) 782 - 2631 (   )   - (   )   - (   )   - (   )   - (   )   - (   )   - (   )   -	<b>TRP Email:</b> David.Lippert@illinois.gov	<b>Meeting Dates:</b> /   / /   / /   / /   / /   / /   / /   /	<b>Minutes Available?</b>			
Short Title & Date of Reports Available: Letter memos/reports on as-needed/requested basis.		End User(s) and Result(s) Expected: All IDOT Districts / improved flexible pavement design.					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

<b>Project Title:</b> M-E Design Implementation & Monitoring For Flexible Pavements	<b>Today's Date:</b> 06/26/06 <b>Function Code:</b> R28
<p><b>Progress to Date (Limit narrative to what fits on this page):</b></p> <p>*Thompson provided responses to questions/comments received from IDOT concerning flexible pavement analysis and design.</p> <p>* Thompson continued to interact with IDOT M&amp;PR in developing/improving PCCP Rubblization policies, specifications, construction procedures, M-E flexible pavement design concepts/procedures, and AC overlay thickness design concepts.</p> <p>* Thompson is cooperating with IDOT in reviewing/modifying proposed Local Roads &amp; Streets M-E design procedures for FULL-DEPTH AC and Conventional Flexible Pavements. Thompson continues to review the March -2005 BLR&amp;S Section 37 (Pavement Design). Review comments continue to be provided to IDOT.</p> <p>* Several critical inputs/policy decisions concerning M-E design of flexible pavements (Bureau of Design / Bureau of Local Roads and Streets) have been identified. Thompson is helping to consider these issues and Amy Schutzbach is coordinating IDOT's efforts to consider these issues.</p> <p>* Thompson continued to interact with IDOT concerning M-E design of Extended Life HMA Pavements.</p> <p>* Several critical inputs/policy decisions concerning M-E design of flexible pavements (Bureau of Design / Bureau of Local Roads and Streets) have been identified. Thompson is helping to consider these issues and Amy Schutzbach is coordinating IDOT's efforts to consider these issues.</p> <p>* A FY-07 Work Plan and Budget for R28 were prepared and submitted to ICT.</p>	



# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Validation Of Extended Life Pavement Design Concepts			Today's Date: 7/5/2006						
			Function Code: IHR-R39						
			Project Number: R 39						
QPR Author Name: S.H. Carpenter			Estimated Dates		Fiscal Year: 2006				
Telephone: (217) 333 - 4188    % Project Completed: 70%					JUL	OCT	JAN	APR	
Task Title			Start	Complete	SEP	DEC	MAR	JUN	
Task 1: Laboratory Testing			07/2004	06/2005	I	I	C		
Task 2: Response Testing			07/2004	06/2005	C				
Task 3: Field Fatigue Testing			07/2004	06/2006	I	I	I	I	
Task 4: AC Overlay/Tack Coat Study			10/2004	05/2005	C				
Task 5: Artificial Neural Network (ANN) Back Calculation			07/2004	06/2006	I	I	I	I	
Task 6:			/	/					
Task 7:			/	/					
Task 8:			/	/					
Task 9:			/	/					
Task 10:			/	/					
<b>Principal Investigator Name/Contact:</b> Samuel H. Carpenter telephone: (217) 333 - 4188 e-mail:scarpent@uiuc.edu			P. I. Organization Name/Address: Dept of Civil and Envir. Engrn 205 N Mathews, MC-250 Urbana, IL 61801		<b>Co-Investigator Name/Contact:</b> M. R. Thompson telephone: (217) 333 - 3930 e-mail:mrthomps@uiuc.edu				
Description of Research: This research will provide test data for dynamic modulus and fatigue for current IDOT mixes in accordance with the AASHTO 2002 data requirements for pavement design. The fatigue testing will validate fatigue algorithms and illustrate the existence and magnitude of a fatigue endurance limit. Constructed pavements will be tested for responses and fatigue behavior. Artificial Neural network technology will be investigated for use in interpreting FWD data to provide a more rapid and accurate method for obtaining layer moduli values.					Keywords: Extended Life, endurance limit, ANN, dynamic modulus, pavement responses				
<b>Technical Review Panel Names:</b> Scott Lackey Jim Trepanier Richard Mauch Hal Wakefield Paul Niedernhofer LaDonna Rowden Amy Schutzbach D. Lippert Tom Winkelman		<b>TRP Telephone:</b> (217) 466 - 7263 (217) 782 - 9607 (618) 346 - 3300 (217) 492 - 4646 (217) 524 - 1651 (217) 782 - 8582 (217) 785 - 4888 (217) 782 - 6732 (217) 782-2940		<b>TRP Email:</b> lackey@dot.il.gov trepanier@dot.il.gov mauchrc@dot.il.gov hal.Wakefield@fhwa.dot.gov niedernhoferpr@dot.il.gov rowdenlr@dot.il.gov schutzbacham@dot.il.gov lippertdl@dot.il.gov winkelmant@dot.il.gov		<b>Meeting Dates:</b> 09/04/2002 04/22/2003 03/04/2004 08/24/2004 11/08/2005 / / / /		<b>Minutes Available?</b> Yes Yes Yes Yes Yes	
Short Title & Date of Reports Available:				End User(s) and Result(s) Expected: IDOT pavement design engineers					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Validation Of Extended Life Pavement Design Concepts	Today's Date: 7/5/2006
	Function Code: IHR-R39
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Task 1. Laboratory Testing. Completed.</p> <p>Task 2. Response Testing. Completed.</p> <p>Task 3. Field Fatigue Testing. Over 43,000 load repetitions were applied to the 6 inch fatigue section. Fatigue cracking developed over the first 25 feet of the section. Crack maps and rut depth measurements have been taken during the testing. After repair to ATLAS, the section will be tested to induce failure in the remaining length of the section. ATLAS has been checked out and is completing testing on existing flexible pavements, and should be available for ELHMAP testing in early May to complete the failure test sequences.</p> <p>Final reports are under preparation for construction, fatigue testing, and dynamic modulus testing, which have been submitted previously to IDOT. Reports detailing mixture effects on fatigue and dynamic modulus are under preparation. A report on the fatigue failure testing is under preparation and will be submitted when field testing is completed. A 6-month extension is under consideration.</p> <p>Task 4. Completed.</p> <p>Task 5. Artificial Neural Network (ANN) Back Calculation.</p> <p>A meeting of the Technical Review Panel for the "NDT Evaluation Using ILLI-PAVE-Based Artificial Neural Networks" study was held at the Bureau of Materials and Physical Research (BMPR) in Springfield on May 30, 2006.</p> <p>ANN models that had been developed for both full-depth HMA and conventional flexible sections that consider the presence of a lime-modified layer were presented. This was necessary, because the critical pavement responses for typical pavement sections on lime-modified layers are very different than for pavements placed directly on no lime sections. These models were then compared with Howard Hill's two algorithms (one for lime and one for no lime) and Marshall Thompson's algorithm for sections with and without lime modification.</p> <p>The validations of these models were confirmed using field data from FA 409, FAI 57 at Ullin, the ATREL test sections, High Cross Road, and the Roseville bypass for the full-depth HMA/lime-modified model. The improvements in the capabilities of the latest version of the ANN software were also presented. Finally, a new analyzer SOFTSYS, Soft Computing Based Pavement &amp; Geomaterial System Analyzer was presented. It is under development by Onur Pekcan, Jamshid Ghaboussi, and Erol Tutumluer. This software is in the process of a patent submission.</p> <p>A 1-year extension is under consideration.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Traffic Operations Lab (Tol)		Today's Date: 6/30/06					
		Function Code: IHR-R43					
		Project Number: R 43					
QPR Author Name: Rahim (Ray) Benekohal		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 244 - 6288	% Project Completed: 30%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Task 1: Signal Coordination & Timing Workshops:		7/05	7/06	I	I	I	I
Task 2: TOL Web site and Computer Network:		7/05	7/06	I	I	I	I
Task 3: Battery Back-up Systems testing and evaluations:		7/04	9/05	C			
Task 4: Task 4. Meetings and Trainings		7/05	7/06	I	I	I	I
Task 5: Task 5. Installation of Video Detection systems:		4/05	7/05	C			
Task 6: Task 6. Data Collection Procedure		7/05	10/06	I	I	I	I
Task 7: Task 7. Data Analysis		7/05	9/07	I	I	I	I
Task 8: Task 8. Final report		7/06	10/07		I		
Task 9:		/	/				
Task 10:		/	/				
<b>Principal Investigator Name/Contact:</b> Prof. Rahim (Ray) Benekohal telephone: (217) 244 - 6288 e-mail: rbenekoh@uiuc.edu		P. I. Organization Name/Address: U of I Urbana Champaign 205 N. Mathews Ave. Urbana, IL 61801 (USA)		<b>Co-Investigator Name/Contact:</b> n/a telephone: (   )   - e-mail:			
Description of Research: The TOL activities are mainly focused on testing and evaluation of new traffic control devices, on investigative and solution oriented research to recommend countermeasures to problems faced in traffic operations, and on providing the hands-on training to the department and municipal employees as well as the students at the university. The main focus of this year's research is evaluation of video detection systems. Regular activities on hands-on training will continue.				Keywords: video detection, loop detection, traffic control devices; UPS for traffic signals, LED,			
<b>Technical Review Panel Names:</b>  Yogi Gautam Jim Schoenherr Jason Johnson	<b>TRP Telephone:</b> (   )   - (217) 782 - 3452 (217) 782 - 3450 (217) 557 - 2070 (   )   - (   )   - (   )   - (   )   -	<b>TRP Email:</b>  gautamyp@ schoenherrja@ johnsonjl@	<b>Meeting Dates:</b> /   / /   / 6/26/06 5/11/06 4/6/06 3/2/06 2/10/06	<b>Minutes Available?</b>  No No No No No			
Short Title & Date of Reports Available: UPS Evaluation Reports		End User(s) and Result(s) Expected: Evaluation of UPS, Loop detectors, and video detection systems					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Traffic Operations Lab	Today's Date: 6/30/06
	Function Code: IHR-R43
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>The scope of activities at TOL is broad and encompasses more than a specific research project. Some tasks listed on previous page are projects in the traditional sense and others are on going activities. The following summarizes the progress on each task.</p> <p>Task 1: Signal Coordination and Timing (SCAT) Workshops- Two SCAT workshops for the district and central office IDOT employees were conducted in Sept 2005 at TOL. Computer network connection to TOL was updated and Synchro software was installed on the server. Computers were tested to make sure all working and ready for the classes.</p> <p>Task 2: TOL Web site and Computer Network- TOL network was connected with fiber optics to the main ATREL building to have high speed internet connection. All PCs were linked to the internet through the new server.</p> <p>Task 3: Battery Back-up Systems (BBS) testing and evaluations- This task was the main focus of work at the lab last year. A report was approved and published in July 2005.</p> <p>Task 4. Meetings and Training - The yearly statewide Highway Lighting and Traffic Signals meetings was held on November 16-18, 2005. The meeting was hosted and presentations were made on the video detection study and BBS. IDOT Haz Mat training and Brown Traffic User Group meetings were held in April 2006.</p> <p>Task 5. Installation of Video Detection (VD) systems - Three vendors provided their video detection systems for evaluation. A signal cabinet is installed on Route 45 to house the VD systems. The three cameras and 6 inductive loop detectors were installed. Computers and input/output devices to measure the performance of the VD systems were installed. The data collection equipment were tested and adjusted. A statewide Signal System Engineers meeting on the VD system installed was held on July 8th, 2005.</p> <p>Task 6. Data Collection Procedure - Scenarios to collect data were decided in cooperation with IDOT staff. A variety of light, traffic, and weather conditions will be considered. An algorithm was developed to find errors in VD systems compared to loop detectors. The algorithm has been validated by viewing video images and the algorithm's output. A set of data was collected and processed. The results were sent to the vendors so they can fine tune the VD setting, if needed. Vendors came and fine tuned their systems. Further modifications are being made to the algorithm. Data collection began in November 2005.</p> <p>Task 7. Data Analysis- The collected data is being analyzed and the errors will be quantified. Four errors are tabulated: false detection, missed detection, stuck-on call, and dropped call. Contributions of light, weather, and traffic parameters on errors will be determined. Analysis of errors in daylight and sunny conditions are completed and the effects of fine tuning of the detector configurations were determined. A short report on this aspect is being prepared to send to vendors.</p> <p>Task 8. Final report- Prepare a final report to include the finding of the study.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Performance And Acceptance Of Self-Consolidating Concrete			Today's Date: 6/29/2006					
			Function Code: R44					
			Project Number: R 44					
QPR Author Name: D.A. Lange			Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 4816	% Project Completed: 99%				JUL	OCT	JAN	APR
Task Title			Start	Complete	SEP	DEC	MAR	JUN
Task 1: Literature Review			7/2003	1/2004				
Task 2: Selection of Candidate Mix Designs Using Illinois Material Sources			8/2003	4/2004				
Task 3: Evaluate Applications			8/2003	4/2005				
Task 4: Experimental Program I – Flow Characteristics			10/2003	4/2007	I	I	I	I
Task 5: Experimental Program I – Segregation Study			10/2003	4/2007	I	I	I	I
Task 6: Experimental Program II – Early Age Mechanical Performance			10/2003	4/2006	I	I	I	C
Task 7: Experimental Program II – Long Term Mechanical Performance			10/2003	4/2006	I	I	I	C
Task 8: Test Protocol and Acceptance Criteria			10/2003	4/2007	I	I	I	I
Task 9: Coordination Meetings			7/2003	7/2007	C	C	C	I
Task 10: Final Reports			6/2006	7/2007				
<b>Principal Investigator Name/Contact:</b> Prof. David Lange telephone: (217) 333 - 4816 e-mail:dlange@uiuc.edu		P. I. Organization Name/Address: University of Illinois 2122 NCEL, MC-250 Urbana, IL 61801		<b>Co-Investigator Name/Contact:</b> Leslie Struble telephone: (217) 333 - 2544 e-mail:				
Description of Research: IDOT has expressed interest in developing SCC materials for use in precast/prestressed member construction and possibly for future use in cast in place construction. Coordination with Illinois precast industry and admixture companies will be maintained through this project. The study will use IDOT-approved materials for potential mix designs that will be used for evaluation of fresh and hardened properties of SCC. Test methods and protocols will be evaluated and acceptance criteria will be proposed. Partnership of IDOT and UIUC expertise serves the central goal of defining successful SCC mixtures and construction practices that can deliver acceptable material properties.					Keywords: SCC, performance, flow, segregation, creep, shrinkage			
<b>Technical Review Panel Names:</b> Brian Pfeifer, Chair BMPR Doug Blades FHWA James Krstulovich BMPR Ken Lang D3 Kevin Riechers BB&S Steve Worsfold D4		<b>TRP Telephone:</b> (217) 782 - 2912 (217) 492 - 4629 (217) 782 - 6733 (815) 434 - 8480 (217) 782 - 9109 (309) 671 - 3676 ( ) - ( ) -		<b>TRP Email:</b> PfeiferBA@dot.il.gov Doug.Blades@fhwa.dot.gov krstulovichjm@dot.il.gov langkr@dot.il.gov riecherskl@dot.il.gov worsfoldsj@dot.il.gov		<b>Meeting Dates:</b> 4/6/2006 11/18/2005 7/1/2005 4/5/2005 11/19/2004 7/20/2004 5/12/2004		<b>Minutes Available?</b> Yes Yes Yes Yes Yes Yes Yes
Short Title & Date of Reports Available: SCC Prestressed Applications 4-14-05			End User(s) and Result(s) Expected: IDOT BMPR Final Report-- June 2007					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Performance And Acceptance Of Self Consolidating Concrete	Today's Date: 6/29/2006
	Function Code: R44

Progress to Date (Limit narrative to what fits on this page):

Project accomplishments to date include a review of the current literature and available test methods. Current trends in mix design have been evaluated and a database of over 150 concrete mixtures was compiled. Candidate control mixtures were selected that represent different strategies in SCC mixture proportioning. The mixtures include one SCC design suitable for PPC I-beams w/ VMA and a conventional I-beam mix design, as well as IDOT mixtures used in Peoria retaining wall projects.

Laboratory testing is in progress to characterize material behavior in both the fresh and hardened states. UIUC began by fabricating test equipment for the various SCC methods. Segregation test methods involving eddy current, falling weights, and image analysis have been used in the laboratory for validation. A test method was developed for evaluating static stability using hardened concrete cylinders. A static segregation test probe was developed, which is a simple device to quickly measure static segregation in the field. The dynamic segregation test is being developed using a 6" x 6" x 6' wood channel. Field measurements are currently being conducted to compare the dynamic segregation behaviors of SCC mixes in the formwork and in the testing apparatus. Concrete flowing in the testing apparatus was analyzed based on rheology and fluid mechanics. From the analysis, the minimum rheology values of cement paste to prevent dynamic segregation can be calculated based on the initial flowing velocity of concrete, and properties of aggregates such as size, density, and volume. Future work is to develop acceptance criteria for the dynamic segregation test and refine the simulation of dynamic segregation.

Early age creep and shrinkage measurements are completed for the candidate SCC mixtures. Long term creep and shrinkage characterization continues. Elastic modulus tests in compression are completed for all materials. Elastic modulus tests in tension are also completed. Autogenous shrinkage, thermal behavior, and internal RH have been measured to assess early age cracking potential. RH profiles through depth were added to characterize drying and these tests are now complete. Restrained ring tests were performed for two SCC mixtures to compare with OPC. Creep testing with various stress levels to define a more robust creep function is complete and the results are being used as input to the finite element code ICON, which was developed to characterize stress development at early age. The model was validated using the differential drying shrinkage test and has been used to analyze different specimens in the laboratory and the field as well as to calibrate creep parameters from simple laboratory experiments.

Concrete core specimens were taken from the UIUC strong wall to analyze dynamic segregation. The results were studied using the segregation shrinkage model to determine the shrinkage potential and investigate the causes for cracking. An analysis of heat development in the wall may also give some insight into the causes for cracking.

Formwork pressure measurements continue in the laboratory and in the field. Testing is underway on the stiffening of SCC under different conditions. Tests with laboratory columns have been performed with the material exposed to extended periods of agitation to understand how SCC behaves when agitated or exposed to prolonged period of external energy sources. These tests are looking at how long the material is influenced by the agitation and to what depth the agitation at the surface has an influence on the stiffening of the concrete. The test column has been redesigned so that it can be more easily used in the lab and on the job site. Work will continue in the area of SCC stiffening to help better predict the pressures in the field. The study will also examine how the time between water addition and placement might influence formwork pressure.

This project has been an active partnership with the Bureau of Materials and Physical Research at IDOT. Regular meetings have been held to provide updates on research progress. The project is conducted by two 1/2-time research assistants under the direction of Prof. David Lange. These students are Matthew D'Ambrosia and Ben Birch. A third 1/2-time research assistant, Lin Shen, is studying fresh properties and segregation under the supervision of Prof. Leslie Struble.

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Concrete Distress Identification			Today's Date: 06/26/2006					
			Function Code: R53					
			Project Number: R 53					
QPR Author Name: Qiang Li			Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 244 - 2355	% Project Completed: %				JUL	OCT	JAN	APR
Task Title			Start	Complete	SEP	DEC	MAR	JUN
Task 1: finish the report of chert project			04/2006	06/2006			I	C
Task 2: petrographic examination of concrete beams and finish the report			04/2006	06/2006			I	C
Task 3:			/	/				
Task 4:			/	/				
Task 5:			/	/				
Task 6:			/	/				
Task 7:			/	/				
Task 8:			/	/				
Task 9:			/	/				
Task 10:			/	/				
<b>Principal Investigator Name/Contact:</b> Leslie J. Struble telephone: (217) 333 - 2544 e-mail: lstruble@uiuc.edu			P. I. Organization Name/Address: Civil and Environmental Engineering, University of Illinois, 2129 Newmark, 205 N. Mathews, Urbana IL, 61801		<b>Co-Investigator Name/Contact:</b> telephone: (   )   - e-mail:			
Description of Research: The research work is to identify the cause of concrete distress observed in relatively new pavement in Valmeyer IL, to assess the alkali-silica reactivity of chert, and to examine concrete laboratory samples for evidence of ASR.					Keywords: concrete, distress, aggregate			
<b>Technical Review Panel Names:</b> Brian Pfeifer		<b>TRP Telephone:</b> (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) - (   ) -		<b>TRP Email:</b>		<b>Meeting Dates:</b> / / / / / / / / / / / / / / / /		<b>Minutes Available?</b>
Short Title & Date of Reports Available:				End User(s) and Result(s) Expected:				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Concrete Distress Identification	Today's Date: 06/26/2006
	Function Code: R
Progress to Date (Limit narrative to what fits on this page):  We finished the final report on ASR reactivity of Illinois chert. The report summarizes the characteristics of Illinois chert and related ASR reactivity based on literature reviews, and some methods addressing the relationship between some intrinsic properties of cherts and ASR reactivity are also presented. For the concrete beams, we finished the petrographic examination and quantitative analysis on mineralogical composition using point counting method. The two final reports will be submitted before next quarterly meeting. The chert project was initially proposed as a two-year project but is being terminated now at the end of the first year.	



# PROGRESS REPORT FOR THE QUARTER ENDING JUNE 2006

Project Title: Illinois Center For Transportation (ICT)/ Deck Beams		Today's Date: 6/30/2006 Function Code: IHR-R54 Project Number: R 54					
QPR Author Name: Dan Kuchma		Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 1571	% Project Completed: 27%			JUL	OCT	JAN	APR
Task Title		Start	Complete	SEP	DEC	MAR	JUN
Task 1: Survey of Current State Practice		07/2005	11/2005	C			
Task 2: Survey of Practice in Other States		09/2005	06/2006	I	I	I	I
Task 3: Review of Bases for Guidelines		10/2005	05/2006	I	I	I	I
Task 4: Design of Research Program		10/2005	06/2006	I	I	I	I
Task 5: Conduct Experimental Research		12/2005	03/2007		I	I	I
Task 6: Analysis and Summary of Test Results		05/2006	06/2007				
Task 7: Produce IDOT Guidelines		04/2007	09/2007				
Task 8: Production of Final Report		07/2007	12/2007				
Task 9:		/	/				
Task 10:		/	/				

<b>Principal Investigator Name/Contact:</b>  Dan Kuchma telephone: (217) 333 - 1571 e-mail:kuchma@uiuc.edu	P. I. Organization Name/Address: CEE Department, UIUC 205 N. Mathews Ave, Urbana, IL 61801	<b>Co-Investigator Name/Contact:</b>  Chris Hart telephone: (217) 244 - 8791 e-mail:chart3@uiuc.edu
Description of Research: Lifting loops for bridge decks typically consist of one or more 7-wire prestressing strands that have been bent into loops. Current national codes and handbooks do not provide guidance for the design of lifting loops for shallow members and consequently individual states and producers are using a variety of different methods. This has led to problems in the field including failure of loops and this poses a significant safety hazard. To address this concern, current practices are being reviewed and a range of lifting loop arrangements are being tested in order to develop a standard practice for IDOT with potential national application.		Keywords: lifting, safety, prestressed concrete, bridges
<b>Technical Review Panel Names:</b> Brian Pfeifer Kevin Riechers Gary Kowalski John Ciccone	<b>TRP Telephone:</b> (217) 782 - 2912 (217) 782 - 9109 (217) 785 - 2914 (217) 782 - 9111 ( ) - ( ) - ( ) - ( ) -	<b>TRP Email:</b> pfeiferba@dot.il.gov riecherskl@dot.il.gov kowalskigm@dot.il.gov cicconejl@dot.il.gov
<b>Meeting Dates:</b> 09/13/2005 04/25/2006 / / / / / / / / / /		<b>Minutes Available?</b> Yes Yes
<b>Short Title &amp; Date of Reports Available:</b> Preliminary Test Plan 11/16/05 Preliminary Test Setup 4/24/06		<b>End User(s) and Result(s) Expected:</b> BBS, Develop new details for lifting loops.

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Illinois Center For Transportation (ICT)/ Deck Beams	Today's Date: 6/30/2006
	Function Code: IHR-R54
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p>Task 1: Survey of State Practice</p> <p>At this time, the practice of Egyptian Concrete, Prestress Engineering Corporation, County Materials, Iowa Prestress Company, and St. Louis Prestress have been collected and reviewed.</p> <p>Task 2: Survey of Practice in Other States</p> <p>The survey of practices in other states has been rescheduled until after the completion of the preliminary tests.</p> <p>Task 3: Review of Bases for Guidelines</p> <p>The bases for the guidelines in the PCI Design Handbook continue to be reviewed as necessary.</p> <p>Task 4: Design of Research Program</p> <p>The UIUC research team met with the technical review panel on April 25, 2006 to discuss the design of the test specimen and details of the experimental setup. During that meeting, the following design and test-set decisions were made. It was determined to prestress the strands. Rather than increasing the depth of the test specimens to provide adequate moment capacity, it was decided to use a large load transfer block. The committee agreed on several critical dimensions including the minimum distance from the strand to the load transfer block and to additional internal reinforcement that was necessary to provide the specimen with the additional capacity that was calculated to be necessary to ensure strand pullout or rupture. In addition, the technical review panel responded to specific questions from the UIUC research team on reinforcement requirements and practices.</p> <p>Since that time, the researchers have been finalizing all aspects of the experimental research program while they wait upon laboratory testing space to become available. The location for the casting and testing of the IDOT test specimens is currently occupied by a project that involves the strength evaluation of railway bridge slabs. The last test in that program is schedule for the second week in July, so the space for fabrication of the IDOT specimens should be available by the end of the month.</p> <p>The UIUC research team has not provided the technical review panel with final drawings for the test specimens as the length of the test specimens are dependent on finalizing of the details of the experimental test setup and some of these details are still being finalized. Specifically, the necessary length for the slabs is dependent on the height of the load transfer slab, loading jacks, load cells, and bend diameter for the strands over the loading apparatus. The researches wished to minimize the height of the loading device for this simplified the test set-up and this required some iteration. The final details are expected to be sent to the technical require panel in the next couple of weeks so that they can be reviewed prior to the availability of laboratory fabrication and testing space.</p> <p>Recent progress includes finalization of the load control system which will use a cluster of four 150 Ton jacks. Load on the lifting loop will be measured using an instrumented 2-inch diameter high-strength treaded rod that connects the lifting loop pin bracket to the eight 0.5-inch strands that pass over the loading system and are securely anchored on the other half of the test specimen. The prestressing will be completed by University of Illinois technical staff using newly developed prestressing capabilities.</p> <p>Task 5: Conduct Experimental Research</p> <p>The fabrication of the test specimens is expected to begin in late July with testing to begin about 6 weeks thereafter.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Tack Coat Optimization For Overlays			Today's Date: 06/26/2006					
			Function Code: R55					
			Project Number: R 55					
QPR Author Name: S. Carpenter and I. Al-Qadi			Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 4188    % Project Completed: 50%					JUL	OCT	JAN	APR
Task Title			Start	Complete	SEP	DEC	MAR	JUN
Task 1: Establish Literature			07/2005	12/2005	I	I	C	C
Task 2: Interface Simulation			04/2006	09/2007		I	I	I
Task 3: Laboratory Evaluation			04/2006	03/2007		I	I	I
Task 4: Modify ATLAS			01/2006	12/2006		I	I	I
Task 5: Overlay Construction			04/2007	06/2007				
Task 6: Conduct Field Performance Testing			04/2007	12/2007				
Task 7: Data Analysis			07/2006	03/2008				
Task 8: Interim and Final Reports			06/2006	05/2008				
Task 9:			/	/				
Task 10:			/	/				
<b>Principal Investigator Name/Contact:</b> Imad Al-Qadi telephone: (217) 265 - 0427 e-mail:algadi@uiuc.edu			P. I. Organization Name/Address: University of Illinois at Urbana-Champaign		<b>Co-Investigator Name/Contact:</b> Samuel H. Carpenter telephone: (217) 333 - 4188 e-mail:scarpent@uiuc.edu			
Description of Research: Perform a coordinated lab, computer simulation, and accelerated full scale testing to optimize tack coat type and application rate on PCC having different surface textures. Effect of HMA mix design will also be investigated					Keywords: Tack Coat, Interface, Overlay			
<b>Technical Review Panel Names:</b> Tom Winkelman Amy Schutzbach Dave Lippert Jim Trepanier Charles Weinrank Patty Broers Terry Hoekstra Derek Parish		<b>TRP Telephone:</b> (217) 782 - 2940 (217) 782 - 4888 (217) 782 - 6732 (217) 782 - 9607 (217) 782 - 0570 (217) 782 - 3547 (217) 342 - 8345 (217) 671 - 3670		<b>TRP Email:</b> WinkelmanTJ@dot.il.gov		<b>Meeting Dates:</b> 08/30/2005 03/30/2006 / / / / / / / / / /		<b>Minutes Available?</b> Yes Yes
Short Title & Date of Reports Available:				End User(s) and Result(s) Expected: Evaluation of tack coat types and application rates and PCC surface effects				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Tack Coat Optimization For Overlays	Today's Date: 06/26/2006
	Function Code: R55
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><b>TASK 1- Current State of Knowledge</b> Literature survey has been revised by adding different perspectives on numerical modeling of tack coat interfaces and by adding a part discussing the effect of interface bonding on the overlay performance.</p> <p><b>TASK 2- Interface simulations</b> Use of special interface elements that needs to be implemented in ABAQUS finite element routines is under investigation. Those elements can be zero or finite thickness. The constitutive model to be used with those interface elements require surface characterization of contacting surfaces, failure characteristics (friction angle, cohesion or adhesion, maximum sliding displacement etc.) Mohr-Coulomb model with cohesion (or adhesion) intercept provides some of these characteristics required for cohesive and frictional interfaces. Surface characterization due to PCC texture variations can also be implemented in the finite element model by regularization (by saw-tooth model or sinusoidal model) of the PCC surface. These surface regularizations have been commonly utilized to characterize asperities on rock surfaces.</p> <p><b>TASK 3- Laboratory evaluation</b> A new load cell for measuring the applied normal force at the interface has been integrated into the laboratory testing fixture. Fixture modifications, per the last meeting discussion, were completed to add stability during testing. Initial tests are currently being performed at room temperature to determine the testing cyclic displacement amplitude. Series of interface shear tests will be performed at three different temperatures and different combinations of tack coat type-rate and mixture type. Materials needed for laboratory tests (SS1-hp emulsion, RC70 cutback, PG64-22, SBS PG70-22, and aggregate) were collected. Dynamic modulus tests are being performed on selected hot mix formula. The results will be used in the finite element model development.</p> <p><b>TASK 4- ATLAS Modification</b> Search for the heaters and heating systems had been completed. A brief summary was submitted to the members of TRP. The source for the appropriate heaters was identified and the manufacturer was contacted. Due the high cost of the heaters and the project limited budget, it was suggested to hold the accelerated testing at this point. During the next project meeting, the PIs and TRP will discuss changing the project scope to focus on laboratory testing and modeling at this point. During that time, a request for the cost of accelerated testing and ATLAS modifications is to be made to the executive committee. This to be discussed at the next project meeting.</p> <p><b>TASK 5-Overlay construction</b> Test section layouts for 5 mph and 10 mph speed of ATLAS were prepared. Layout for testing at 5mph was selected.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Speed Photo Enforcement		Today's Date: 6/30/06						
		Function Code: IHR-R56						
		Project Number: R 56						
QPR Author Name: Rahim (Ray) Benekohal		Estimated Dates		Fiscal Year: 2006				
Telephone: (217) 244 - 6288	% Project Completed: 20%			JUL	OCT	JAN	APR	
Task Title		Start	Complete	SEP	DEC	MAR	JUN	
Task 1: Task 1- Literature Review		7/05	10/05	I	I	I	I	
Task 2: Task 2- Select WZ and Collect Field Data		8/05	9/06	I	I	I	I	
Task 3: Task 3- Analyze Dist 7 WZ data		9/05	5/06	I	I	I	I	
Task 4: Task 4- Effects of Police and "YOUR SPEED IS" Sign on Speed		3/06	10/06				I	
Task 5: Task 5- Effects of SPE on Speed and Speed Variation		3/06	10/06				I	
Task 6: Task 6- Spatial effects of SPE on Speed in WZ		3/06	10/06				I	
Task 7: Task 7- Temporal effects of SPE on Speed in WZ		3/06	10/06				I	
Task 8: Task 8- Speeding tickets and Court Decisions		2/06	4/07					
Task 9: Task 9- Prepare Reports		1/07	6/07					
Task 10:		/	/					
<b>Principal Investigator Name/Contact:</b> Prof. Rahim (Ray) Benekohal telephone: (217) 244 - 6288 e-mail: rbenekoh@uiuc.edu		P. I. Organization Name/Address: U of I Urbana Champaign 205 N. Mathews Ave. Urbana, IL 61801 (USA)		<b>Co-Investigator Name/Contact:</b> n/a telephone: (   )   - e-mail:				
Description of Research: This study will evaluate the effects of using speed photo enforcement (SPE) systems on traffic flow characteristics and safety in work zones (WZ). The overall goal is to determine the effectiveness of SPE in work zones using criteria such as: speed, speeding tickets issued and fraction upheld as valid in courts. The net effects of SPE above and beyond the "typical" traffic control procedure IDOT uses in WZ will be determined. Effects of police presence, "YOUR SPEED IS" sign, and SPE van in work zone alone or in combination will be studied.				Keywords: work zone speed, photo speed enforcement, police presence, dynamic speed sign, photo radar, construction zone speed				
<b>Technical Review Panel Names:</b> Dennis Huckaba Mathew Mueller Mike Staggs Sharon Haasis John Benda Priscilla Tobias		<b>TRP Telephone:</b> (217) 782 - 8606 (217) 558 - 1793 (217) 492 - 4630 (217) 782 - 0551 (630) 241 - 6800 (217) 782 - 3568 (   )   - (   )   -		<b>TRP Email:</b> HUCKABADA@dot.il.gov MUELLERMW@dot.il.gov Mike.staggs@fhwa.dot.gov  HaasisSL@dot.il.gov jbenda@getipass.com tobiaspa@dot.il.gov		<b>Meeting Dates:</b> 10/2/05 5/5/06 / / / / / / / / / /		<b>Minutes Available?</b> No No
Short Title & Date of Reports Available:		End User(s) and Result(s) Expected: effectiveness of photo speed enforcement in work zones						

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Speed Photo Enforcement	Today's Date: 6/30/06
	Function Code: IHR-R56

Progress to Date (Limit narrative to what fits on this page):

This study had planned to collect data in summer/fall of 2005 assuming that the speed photo enforcement vans would be deployed in July 2005. The vans were delivered in December 2005 and were ready for deployment in May 2006. Due to the delay in deployment, the data collection plan had to be postponed to 2006 construction season. On May 5th 2006, IDOT personnel and the researcher met and revised the data collection plan and agreed to change the completion date of the project to Oct 2007. Data collection started in June 2006 at I-64 work zone near East St Louis area.

Task 1- Literature Review- Review the literature on photo enforcement, speed and speeding in work zones.

Task 2- Select WZ and Collect Field Data- Three work zone sites will be selected for data collection. It is anticipated to collect data for five different work zone conditions. Speeds will be measured at two locations within work zone to determine the spatial effects of SPE.

Task 3- Analyze Dist 7 WZ data- Data from IDOT District 7 for 2004 where they used "YOUR SPEED IS" trailer was analyzed to find the immediate effects and the effects after a few weeks of using the trailer. A report entitled "Speed Reduction Effects of Displaying Speed of Motorists in Highway Work Zones" was sent to IDOT in January 2005. Data for 2005 is being analyzed.

Task 4- Effects of Police and "YOUR SPEED IS" Sign on Speed - The speed reduction effects of police presence and "YOUR SPEED IS" sign will be determined in order to accurately isolate the effectiveness of SPE. Data has been collected at one site when police presence or the sign was used individually and at the same time.

Task 5- Effects of SPE on Speed and Speed Variation - Analyze the data on speed and speed variation/uniformity to determine the effects of SPE on speed in WZ. Data for I-64 site for all five WZ conditions will be reduced to determine the net effects of the SPE system. Multiple comparisons will be made among the seven cases.

Task 6- Spatial effects of SPE on Speed in WZ - Near the photo enforcement van drivers may reduce their speeds, but passing it they may increase their speeds. The effects of the system on speed at a point 1-3 miles downstream from the equipped van will be determined (spatial effect).

Task 7- Temporal effects of SPE on Speed in WZ - When police is present in WZ drivers often slow down, but when police leaves the WZ the speed often increases. This phenomenon may happen with SPE. Data was collected at one site after the van was taken out of a WZ to determine the temporal effects of SPE.

Task 8- Speeding tickets and Court Decisions - Determine the number of speeding tickets issued at those two sites and trace a sample of those tickets to estimate the fraction of tickets that is upheld as valid at courts.

Task 9- Prepare Reports - Prepare a final report on study findings and seek its approval from the TRP. Prepare interim and quarterly progress reports.

# PROGRESS REPORT FOR THE QUARTER ENDING JUNE 2006

Project Title: Evaluation And Implementation of Improved CRCP and JPCP Design Methods for Illinois				Today's Date: 6/30/2006					
				Function Code: IHR-R57					
				Project Number: R 57					
QPR Author Name: Roesler, Jeffery				Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 265 - 0218		% Project Completed: 16%				JUL	OCT	JAN	APR
Task Title				Start	Complete	SEP	DEC	MAR	JUN
Task 1: Evaluation of DG2002 for Concrete Pavements				07/2005	09/2006	I	I	I	I
Task 2: Laboratory Characterization of Material Inputs				01/2006	06/2007	I	I	I	i
Task 3: Traffic Characterization				10/2005	10/2006	I	i	I	I
Task 4: Field Survey Review				10/2005	06/2007	I	I	I	i
Task 5: Calibration and Validation of Design Methodology				01/2007	06/2008				
Task 6: CRCP Model Refinements				10/2006	01/2008	I	I	I	I
Task 7: Built-in Curl Characterization				10/2005	09/2006	I	I	I	I
Task 8: Climatic Zone Study				01/2006	09/2006	I	I	I	I
Task 9: Special Case Studies for JPCP				01/2006	09/2006	I	I	I	I
Task 10:				/	/				
<b>Principal Investigator Name/Contact:</b> Jeffery Roesler telephone: (217) 265 - 0218 e-mail: jroesler@uiuc.edu			P. I. Organization Name/Address: University of Illinois 205 N. Mathews, MC-250 Urbana, IL 61801			<b>Co-Investigator Name/Contact:</b> telephone: (   )   - e-mail:			
Description of Research: With the recent release of the Mechanistic-Empirical (M-E) Pavement Design Guide (DG2002), many states are evaluating its applicability against their existing design methods. IDOT already has an existing jointed plain concrete pavement (JPCP) design based on M-E principles. However, IDOT does not have an M-E based continuously reinforced concrete pavement (CRCP) design procedure. The objectives of the study are to refine the JPCP design method based on new findings from the past 15 years and to develop and implement a CRCP design process that IDOT can use for routine design.						Keywords: Concrete pavement design, concrete materials, JPCP, CRCP			
<b>Technical Review Panel Names:</b> Amy Schutzbach (Chair) David Lippert Tom Winkelman LaDonna Rowden Chuck Wienrank Paul Niedernhofer Hal Wakefield			<b>TRP Telephone:</b> (217) 785 - 4888 (217) 782 - 6732 (217) 782 - 2940 (217) 782 - 8582 (217) 782 - 0570 (217) 524 - 1651 (217) 492 - 4646		<b>TRP Email:</b> schutzbacham@dot.il.gov lippertdl@dot.il.gov winkelmantj@dot.il.gov rowdenlr@dot.il.gov wienrankcj@dot.il.gov niedernhoferpr@dot.il.gov hal.Wakefield@fhwa.dot.gov		<b>Meeting Dates:</b> 09/13/2005 05/11/2006 / / / / / / / /		<b>Minutes Available?</b> Yes Yes
Short Title & Date of Reports Available: 2005-2007 Workplan				End User(s) and Result(s) Expected: IDOT BMPR and Districts New CRCP Design Guide Improved JPCP Design Guide					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation And Implementation Of Improved CRCP And JPCP Design Methods	Today's Date: 06/30/2006 Function Code: IHR-R57
Progress to Date (Limit narrative to what fits on this page):	
<p>During the second quarter 2006, a series of JPCP and CRCP designs were conducted by using DG2002 and IDOT Design methods. The main objective of this design guide comparison was to determine their respective sensitivities and similarities/differences for the state of Illinois and determine what modifications may be needed for the IDOT JPCP method and features to address in the future IDOT CRCP method. To conduct this study, the research team complied load spectra and axle spacing distribution data for several weigh stations across the state and weigh-in-motion data for the Pesotum I-57 site (supplied to UIUC by IDOT personnel). This information will later be used to assess the impact of variability in load spectra and steer-drive axle spacing on predicted rigid pavement performance through use of both the Mechanistic-Empirical Pavement Design Guide (DG2002) and RadiCAL and will result in a separate technical note. The design sensitivity study specifically investigated traffic levels (low, medium and high), climatic zones (Chicago, Champaign and Carbondale) and shoulder type (asphalt concrete shoulder, tied shoulder and widened slab). A technical note summarizing JPCP and CRCP design results, comparisons and UIUC conclusions were submitted to the IDOT's TRP chair for this project. The key findings were the climatic changes in Illinois have little effect on thickness design except near Lake Michigan, load spectra versus ESAL comparison gave similar results, and the majority of the failures for concrete pavements in Illinois using DG2002 were top-down cracking, which may not be correct and needs further evaluation.</p> <p>The preliminary FORTRAN program for calculating CRCP punchout was updated to include an ESAL-based stress prediction model developed by Zollinger. A document listing the models in the CRCP FORTRAN has been updated and will be forwarded to IDOT soon. The CRCP program now is ready for model improvement and revision to tailor the design method to IDOT's readily available inputs and calibration data.</p> <p>CRCP monthly crack width refinement is being carried out. Given the crack spacing, there are two types of shrinkage involved in the formulation of crack width. One is the free shrinkage caused by the temperature drop and moisture loss; another is the restrained shrinkage (extension) caused by the external restraint such as slab-base friction and steel bar restraining. Literature reviews on concrete shrinkage composite models shows that most of these models simply treat concrete as an elastic material, and predict the elastic free shrinkage, which tend to overestimate the actual crack width. Currently, a new crack width formula based on elastic concrete free shrinkage and a visco-elastic solution of restrained concrete shrinkage with creep is being derived.</p> <p>A 1-D heat transfer model for predicting the temperature distribution in the concrete pavement was also formulated in order to develop the capability to evaluate the effects of the ambient weather conditions on concrete pavement temperatures at early ages and the effects of other factors like concrete mix temperature, hydration kinetics, and BAM temperature. Numerical schemes obtained from finite-difference spatial discretization and forward-Euler time integrator generate reasonable temperature profile in the PCC pavement based on typical meteorological factors, such as air temperature, solar radiation, wind speed, etc. and an initial PCC temperature profile. As this model evolves, it can eventually be used as a tool to answer "what if" construction questions that have been posed by research staff at IDOT over the past 5 year concerning concrete mix temperatures, BAM temperatures, air temperature requirements, etc.</p> <p>A technical note on FWD backcalculation of built-in curl on JPCP sections in Illinois is now completed. Initial results show built-in curl levels equivalent to a temperature difference of -5 to -10°F in most cases on US-20 and little to no built-in curl on the US-67 sections due to the high level of restraint from dowels and tie bars.</p> <p>The impact of over-restraint in ramp sections was investigated and found that the minimum amount of steel required was vastly exceeded in many designs. Further investigation into typical and newer ramp designs was also conducted from plans received from District 1 and will be summarized in a forthcoming technical note.</p> <p>A non-linear temperature profile distribution has been formulated and almost implemented for use in the RadiCAL program in order to assess the climatic effects in the state of Illinois. This will allow for a better prediction of the impact of temperature stresses on JPCP fatigue analysis and design as many curling stresses are typically overestimated when using a linear temperature distribution assumption. This evaluation, in conjunction with the IDOT-DG2002 design comparison technical note, will help determine whether additional climatic considerations should be included in the IDOT design method for different regions of the state.</p> <p>An initial evaluation of the concept of an endurance limit was also presented for JPCP. This initial study only looked at edge loaded slabs with an assumed level of temperature curling. A further analysis needs to be conducted to look at other load locations and curling assumptions for both JPCP and CRCP.</p>	



# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Cost-Effectiveness And Performance Of Overlay Systems In Illinois			Today's Date: 7/5/2006					
			Function Code: R58					
			Project Number: R 58					
QPR Author Name: Al-Qadi, Buttlar, Kim, Baek			Estimated Dates		Fiscal Year: 2006			
Telephone: (217) 333 - 5966    % Project Completed: 30%					JUL	OCT	JAN	APR
Task Title			Start	Complete	SEP	DEC	MAR	JUN
Task 1: Survey Districts			07/2005	12/2005	I	I	I	I
Task 2: Site Visits and Performance Data Gathering			07/2005	06/2008	I	I	I	I
Task 3: Forensic Investigation			04/2006	06/2008				I
Task 4: Laboratory Testing			07/2006	01/2008			I	I
Task 5: Pavement Analysis			01/2006	03/2008				I
Task 6: Demonstration Projects			01/2006	10/2007				
Task 7: LCCA			04/2007	12/2007				
Task 8: Preliminary Usage Guide			07/2007	06/2008				
Task 9: Project Deliverables			04/2007	06/2008				
Task 10:			/	/				
<b>Principal Investigator Name/Contact:</b> William G. Buttlar telephone: (217) 333 - 5966 e-mail:buttlar@uiuc.edu		P. I. Organization Name/Address: University of Illinois		<b>Co-Investigator Name/Contact:</b> Imad L. Al-Qadi telephone: (217) 265 - 0427 e-mail:alqadi@uiuc.edu				
Description of Research: Evaluate the cost-effectiveness of traditional overlay systems used in Illinois and to evaluate recent reflective crack control strategies through laboratory, field demonstration projects, and LCCA. A preliminary guide to assist the pavement engineer in the selection of rehabilitation techniques to control reflective cracking will be developed.					Keywords: Reflective Cracking, Crack Control, Interface, Overlay, Asphalt, LCCA, Life-cycle cost, Rehabilitation			
<b>Technical Review Panel Names:</b> Joe Vespa Amy Schutzbach Dave Lippert Jim Trepanier Aaron Toliver Patty Broers		<b>TRP Telephone:</b> (217) 782 - 6538 (217) 785 - 4888 (217) 782 - 6732 (217) 782 - 9607 (217) 782 - 0564 (217) 782 - 3547 (   )   - (   )   -		<b>TRP Email:</b> VespaJW@dot.il.gov SchutzbachAM@dot.il.gov LippertDL@dot.il.gov TrepanierJS@dot.il.gov toliverat@dot.il.gov broerspa@dot.il.gov		<b>Meeting Dates:</b> 08/30/2005 12/16/2005 04/10/2006 * / / / / / / / /		<b>Minutes Available?</b> Yes Yes Yes
Short Title & Date of Reports Available: *Weekly UIUC meeting minutes are also avail. upon request			End User(s) and Result(s) Expected: Field demonstration project Overlay life cycle cost anaysis Preliminary user guide					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Cost-Effectiveness And Performance Of Overlay Systems In Illinois	Today's Date: 07/05/2006 Function Code: R58
Progress to Date (Limit narrative to what fits on this page):	
<p>Note: Percent project completed on pg. 1 is based upon three-year project duration.</p> <p>Task 1. District Survey: A packet of revised survey forms per each of nine IDOT Districts has been developed and sent to Joe Vespa for reviews and distributions across the IDOT Districts. The packet includes three different colored forms in Yellow, Orange, and White. Survey forms have been filled with known information by UIUC research team in Yellow and Orange forms as determined in the previous quarterly meeting. These forms can be checked by the District correspondents for corrections and updates. Blank White forms have been provided for use of the Districts to report any newer reflective cracking treatment projects with available control section information. Once the survey forms return to the UIUC research team, phone interviews of the Districts can be made for following up the survey as recommended by Dave Lippert.</p> <p>Task 2: Site visits and Perf. Data: Several site visits to the proposed full forensic investigation projects were made during this quarter. These include three sites on US136 near San Jose (two sites are West of San Jose, a few miles away from one other and the other one is located several miles East of San Jose just West of the I-155 interchange). Two sites on IL29 near Creve Couer and Mossville were also visited. Detailed visual crack mapping and videotaping of the pavement surface by UIUC automated Data Collection Vehicles (DCVs) were conducted on the three US136 sites, while the Ground Penetrating Radar (GPR) to get the sub-surface pavement structural profile and coring of pavement for forensic investigation were conducted at the two IL29 sites in addition to crack mapping and digital imaging. Summary reports of these activities have been prepared and posted on the UIUC ICT R58 FTP server. Also in the reports, comparisons between live crack count results and those from the video image were made. Site visits to IL130 of District 5 and more locations where control sections are available will be made early in the next quarter for crack mapping and coring along with, logistics permitting, DCV and GPR data collection.</p> <p>Task 3: Forensic Investigation: Field cores have been collected from the two IL29 projects this quarter. Traffic control was provided by IDOT/ District 4. A summary report of findings from coring and crack mapping has been prepared and made available on the UIUC FTP server. 29 at Creve Couer revealed an interesting phenomenon. All three cores taken over the cracks from IL29 Creve Couer project were at the edge of the fabric, rather than directly over the underlying joint in the PCC. Forensic study information on US136 and IL130 will be continued early next quarter.</p> <p>Task 4: Laboratory Testing: A first-round of laboratory testing plan for IL29 field cored samples has been developed. As planned earlier, field cores will be tested for the determination of bulk material properties, fracture energy, interface shearing stiffness, and interlayer permeability. In addition to the planned laboratory testing, it was proposed to look at the effect of PCC surface texture on the performance of strip type fabric treatments. Premature debonding is suspected to occur between the fabric and the smooth PCC surface. This could expedite crack development. Once the first round laboratory testing is completed, the next sets of field samples from US136 and IL130 can be tested. We will present the laboratory testing results at the next quarterly meeting.</p> <p>Task 5: Pavement Analysis: A literature review is being conducted on modeling and analysis of overlay interface. Crack propagation and simulated loading will be utilized to analyze reflective cracking development. This will assist in the evaluation of the effectiveness of interlayer systems and assist in the understanding the mechanisms for the deterioration of the overlay system. The model will be used to quantify the effectiveness of the interlayer systems as well as the pavement overlay parameters.</p> <p>P.S. Per discussion with Dave Lippert, a discussion of the project scope may be needed to reflect the changes in the budgetary resources available to the project. This could take place in the next meeting.</p>	

# PROGRESS REPORT FOR QUARTER ENDING JUNE 2006

Project Title: Evaluation Of Pavement Damage Due To New Tire Designs		Today's Date: 06/23/2006						
		Function Code: IHR-R59						
		Project Number: R 59						
QPR Author Name: I. L. Al-Qadi		Estimated Dates		Fiscal Year: 2006				
Telephone: (217) 265 - 0427	% Project Completed: 20%			JUL	OCT	JAN	APR	
Task Title		Start	Complete	SEP	DEC	MAR	JUN	
Task 1: Accelerated Loading Experiment on the Full-Depth HMA Flexible Pavement Test Sections		01/2006	06/2006			I	I	
Task 2: Analyze Collected Data from Accelerated Pavement Testing		04/2006	12/2006				I	
Task 3: Quantify Pavement Damage due to Different Tire Configurations Using Experimental Measurements		07/2006	12/2006				I	
Task 4: Finite Element Modeling of the Experimental Test Sections		07/2006	06/2007				I	
Task 5: FE Simulation of Loading Response at Highway Speeds		01/2007	09/2007					
Task 6: Incorporation of Dynamic Tire Impacts and Lateral Loading		04/2007	12/2007					
Task 7: FE Analysis of Overweight Axle Loads		07/2007	06/2008					
Task 8: Life-Cycle Cost Analysis		04/2008	12/2008					
Task 9: Reports and Communication		09/2008	12/2008					
Task 10:		/	/					
<b>Principal Investigator Name/Contact:</b> Imad L. Al-Qadi telephone: (217) 265 - 0427 e-mail: alqadi@uiuc.edu		P. I. Organization Name/Address: UIUC		<b>Co-Investigator Name/Contact:</b>  telephone: (   )   - e-mail:				
Description of Research: Quantify pavement damage due to different tire and axle configurations based on accelerated pavement testing and numerical modeling using the finite element method for moving load simulation				Keywords: Pavement Damage, Tire Loading, Widebase, Simulation				
<b>Technical Review Panel Names:</b> Mark Gawedzinski Rich Telford Amy Schutzbach Bruce Peebles Charles Wienrank David Lippert		<b>TRP Telephone:</b> (217) 782 - 2799 (217) 782 - 2984 (217) 782 - 4888 (217) 782 - 0570 (618) 351 - 5270 (217) 782 - 6732 (   )   - (   )   -		<b>TRP Email:</b> Mark.Gawedzinski@illinois.gov  Amy.Schutzbach@illinois.gov Bruce.Peebles@illinois.gov Charles.Wienrank@illinois.gov David.Lippert@illinois.gov		<b>Meeting Dates:</b> 05/05/2006 / / / / / / / / / / / /		<b>Minutes Available?</b> No
Short Title & Date of Reports Available:			End User(s) and Result(s) Expected: Determine pavement damage due to different tire configuration					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-782-3547

## QUARTERLY PROGRESS REPORT (CONTINUED)

Project Title: Evaluation Of Pavement Damage Due To New Tire Designs	Today's Date: 06/23/2006 Function Code: IHR-R59
<p>Progress to Date (Limit narrative to what fits on this page):</p> <p><b>TASK 1</b> Response testing over section F is completed. Strain responses were collected using widebase tires 425 and 455 and dual-tire assembly configuration. The tests were conducted at various speeds, inflation pressures, and offset distances from the strain gauge. Each case was conducted for 50 passes. Temperature profile was collected during testing. The temperature data will be utilized in the data analysis. Testing of section D will start in July 2006.</p> <p><b>TASK 2:</b> Data analysis for section F is partially completed. Preliminary results were presented during the first TRP meeting on May, 05, 2006. Results of the preliminary analysis of section F response to various loading configurations were used to quantify the pavement damage in terms of fatigue, top-down cracking and secondary rutting due to the use of wide-base tire and dual-tire assembly. A pdf copy of the power point presentation was sent to the TRP chair.</p> <p><b>TASK 3:</b> A 3-D finite element mesh simulating section F was developed. A model utilizing visco-elastic characteristics of hot-mix asphalt (HMA) has been used to verify the strain gauge response. The viscoelastic material properties were determined using the complex modulus experimental data and used to determine the Prony series parameters.</p>	

# **HIGHWAY RESEARCH COUNCIL**

# PROGRESS REPORT FOR THE QUARTER ENDING JUNE 2006

Project Title: Effectiveness Of Sealers And Laminates For Concrete Bridge Decks.			Today's Date: 7/13/2006						
			Function Code: IHR-R07						
			Project Number:						
QPR Author Name: Kelly Morse / Tom Winkelman			Estimated Dates		Fiscal Year: 2006				
Telephone: (217) 782 - 7218    % Project Completed: 60%					JUL	OCT	JAN	APR	
Task Title			Start	Complete	SEP	DEC	MAR	JUN	
Task 1: Literature Search of Previous Research			3/2002	3/2004	C	C	C	C	
Task 2: Survey of Other States Experience and Procedures			3/2003	3/2004	C	C	C	C	
Task 3: Collect Data from Experimental Features (IL02-01)			6/2002	6/2007	I	I	I	I	
Task 4: Evaluate Collected Data (IL02-01)			6/2002	8/2007	I	I	I	I	
Task 5: Evaluate Chloride Content Versus Corrosion Rate			6/2007	8/2007					
Task 6: Develop Product List of Accepted Sealers			8/2007	8/2007					
Task 7: Develop List of Applicable Bridges			8/2007	8/2007					
Task 8: Develop Tests for Sealer Performance and Approval			3/2002	7/2007	I	I	I	I	
Task 9: Write Report of Findings			9/2007	12/2007					
Task 10: Develop or Change Policy			9/2007	12/2007					
<b>Principal Investigator Name/Contact:</b> Kelly Morse telephone: (217) 782 - 7218 e-mail:morsekl@dot.il.gov		P. I. Organization Name/Address: Illinois DOT - BM & PR 126 East Ash Street Springfield IL 62704		<b>Co-Investigator Name/Contact:</b> Tom Winkelman telephone: (217) 782 - 2940 e-mail:winkelmantj@dot.il.gov					
Description of Research: This research will investigate the performance of bridge deck protectants to inhibit the progression of deicing salts into concrete bridge decks. Evaluations of sealers, laminates, and bituminous membranes will be performed as part of this research effort. Visual surveys and chloride ion samples of the concrete bridge decks will be used as a performance evaluation of the protectants. Surveys and samples are scheduled at the initial time of construction or application, and continuing for a period of five years thereafter. The objective of the research is to develop an approved list of protectant materials, an application procedure, and an application timeframe for bridges.					Keywords: Concrete, Reinforcing Steel, Corrosion, Silanes, Siloxanes, Polymer Concrete, Bituminous Membranes, Chloride Ion				
<b>Technical Review Panel Names:</b> Dan Brydl - FHWA Dave Copenbarger IDOT D6 Doug Dirks - IDOT - BMPR Mark Eckhoff - IDOT - D4  Ken Lang - IDOT - D3  Carl Puzey - IDOT - BBS		<b>TRP Telephone:</b> (217) 492 - 4632 (217) 785 - 5306 (217) 782 - 7208 (309) 671 - 4463 ( ) - (815) 434 - 8480 ( ) - (217) 785 - 4511		<b>TRP Email:</b> BrydlD@igate.fhwa.dot.gov CopenbargerDA@dot.il.gov DirksDA@dot.il.gov EckhoffMS@dot.il.gov  LangKR@dot.il.gov  PuzeyDC@dot.il.gov		<b>Meeting Dates:</b> 3/22/2002 8/27/2002 4/29/2004  / / / / / / / /		<b>Minutes Available?</b> Yes Yes Yes	
Short Title & Date of Reports Available: Eval. of Sealers and Laminates for Protection of Bridge Decks				End User(s) and Result(s) Expected: IDOT policy for the future use of sealers and laminates.					

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.

## QUARTERLY PROGRESS REPORT (CONTINUED)

<b>Project Title:</b> Effectiveness Of Sealers And Laminates For Concrete Bridge Decks.	<b>Today's Date:</b> 7/13/2006
	<b>Function Code:</b> IHR-R07
<b>Progress to Date (Limit narrative to what fits on this page):</b>	
<p>2006 1<sup>st</sup> Quarter</p> <p>A presentation on the current status of the research was prepared and presented at the annual Materials Engineers Conference, the Transportation and Highway Engineering Conference, and the District 5 Project Implementation meeting. A revision to the 2007 Standard Specifications Book was discussed and proposed to include protective coat on all new construction with the Contractor's option to use a sealant in place of the protective coat.</p> <p>2006 2<sup>nd</sup> Quarter</p> <p>Bridge deck sampling was completed for all the project structures in Districts 3, 4, 5, and 6. The Clark Bridge project is scheduled to be completed this summer by internal IDOT forces. Product recommendations were made for this structure. A special request was made by District 1 for some chloride sampling of the Dan Ryan Expressway flyover of Interstate 55 in Chicago.</p>	

# PROGRESS REPORT FOR THE QUARTER ENDING MARCH 2006

Project Title: Investigation Of Select Lrfd Design Factors Through Instrumentation Of Bridge Bearings			Today's Date: 7/11/06					
			Function Code: IHR-R38					
			Project Number: FY 06					
QPR Author Name: Brad Cross			Estimated Dates		Calendar Year: 2006			
Telephone: (618) 650 - 2648	% Project Completed: 100%				JAN	APR	JUL	OCT
Task Title			Start	Complete	MAR	JUN	SEP	DEC
Task 1: Bridge Selection and Instrumentation Plan			2/2004	9/2005	C			
Task 2: Instrument Installation and Data Collection			5/2004	6/2006	I	C		
Task 3: Data Analysis and Final Report			8/2004	6/2006	I	C		
Task 4:			/	/				
Task 5:			/	/				
Task 6:			/	/				
Task 7:			/	/				
Task 8:			/	/				
Task 9:			/	/				
Task 10:			/	/				
<b>Principal Investigator Name/Contact:</b> Brad Cross telephone: (618) 650 - 2648 e-mail:bcross@siue.edu			P. I. Organization Name/Address: Southern IL Univ. Edwardsville Edwardsville, IL 62026-1800		<b>Co-Investigator Name/Contact:</b> Nader Panahshahi telephone: (618) 650 - 2819 e-mail:npanahs@siue.edu			
Description of Research: Instrumentation for 12 bridges along I-55 to determine the validity of select factors in the LRFD design procedures.					Keywords: LRFD, instrumentation, shear			
<b>Technical Review Panel Names:</b> Tom Domagalski Patty Broers Mark Gawedzinski		<b>TRP Telephone:</b> (217) 785 - 2913 (217) 782 - 3547 (217) 782 - 2799 ( ) - ( ) - ( ) - ( ) - ( ) -		<b>TRP Email:</b> DOMAGALSKITJ BroersPA gawedzinskij		<b>Meeting Dates:</b> 3/17/2004 6/11/2004 11/18/2004 3/8/2005 6/13/2005 10/11/2005 / /		<b>Minutes Available?</b> Yes Yes Yes Yes Yes Yes
Short Title & Date of Reports Available: Instrumentation Plan 6/11/2004 Draft Final Report 5/15/2006 Final Report 6/30/2006				End User(s) and Result(s) Expected: IDOT and FHWA are the anticipated end users. Results will discuss measured bearing shear forces.				

Instructions for each field appear at the bottom of the screen.

For questions, please contact the Research Coordinator at 217-557-6038.



## QUARTERLY PROGRESS REPORT (CONTINUED)

<b>Project Title:</b> Investigation Of Select Lrfd Design Factors Through Instrumentation	<b>Today's Date:</b> 7/11/2006 <b>Function Code:</b> IHR-R38
<p><b>Progress to Date (Limit narrative to what fits on this page):</b></p> <p>Final Report for the project is complete and has been delivered to Tom Domagalski. Project results show that, in general, the LRFD Bridge Specification produces design values that are closer to actual behavior than those predicted by the LFD Specification. A full copy of the final report is available in electronic form by contact Brad Cross (bcross@siue.edu).</p>	